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UNIVERSITY OF TORONTO

REPORT OF THE DEAN

OF THE

FACULTY OF MEDICINE

Session 1960-1961

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THE DEAN OF THE FACULTY OF MEDICINE

I suppose that never in world history has the profession of Medicine, and indeed those other professions and ancillary services which are associated with it, been so closely and continuously under observation and subject to so much comment and discussion by the citizens of any country as is the case today in Canada and the United States.

As Canadian citizens we are well aware of the advances in the prevention and treatment of disease, we are sure that new and better remedies are to be found for heart disease, that we will find the cause of and the treatment for cancer, that we will allay some of the ravages of aging. We believe that all these benefits should be available for all the people, but we are in some doubt as to the methods by which they should be provided.

The doctor himself, rather breathless at the pace, has little time to think of what the future holds for him. He is constantly being provided with new diagnostic methods, new drugs which may result from the sometimes difficult association of the *entrepreneur* with the research scientists, new ideas of social scientists, of economists, of legislators as to how the benefits of medicine shall reach the people. If he is wise he holds fast to the truth that he must still assess the patient's individual needs in the midst of this ever-changing world, that he must understand the patient's reactions to the stresses and strains of his environment, and hope to have the wisdom and training to give the patient the sort of advice to which an ill, disturbed or injured human is entitled in the light of present-day knowledge.

Hospital insurance is now in operation in all the ten provinces of Canada. Medical care insurance is promised in one western province, and the Federal Government has just announced the personnel and terms of reference for a new Royal Commission which has been directed to make the widest examination of the various factors involved in maintaining the health of the nation and the means of improving it by education, research, and the increased availability of services. Medical schools touch every possible facet of the various and highly complex subjects of modern medicine and the public interest in its availability for the people. What is the future image of the physician? What should be the content and the duration of his undergraduate education? What are the further requirements for training before he begins his practice? Will he practise in a group? Will the hospital services be decentralized? Is there a place for a community health centre? What is the ideal size of a teaching hospital? How will the further extension of the insurance principle affect the organization of a teaching unit? Can undergraduate and postgraduate teaching be carried on in the same hospitals by the same staffs? Are we to continue long vacations for medical students, to enable them to earn the money for steadily increasing tuition fees? Should there be a serious review of the costs of medical education to the student? Should there be a careful assessment of the work of the final year, in relation to the rotating internship?

These and many other questions particularly related to the future of our own medical school will be examined by the special committee on curriculum and organization to which Dr. W. Oille has recently been appointed as Co-ordinator of the project. He has been granted leave from all teaching duties and from his responsibilities on the wards of the Toronto General Hospital to enable him to carry out his studies. It is estimated that it will take at least 18 months before the committee will be ready to make its report.

There has been an increase in the number of applicants for the premedical year in the fall session of 1961, as well as for the first professional year; if this trend continues—and all the indications are in that direction—it will necessitate an expansion of the enrolment in this school or the early establishment of a new medical school in Southern Ontario, where the density of population is steadily increasing.

We admitted the usual 125 students last year to the first premedical year, and a further 50 for the first professional year have been accepted for the fall session. The admissions to the diploma course in Physical and Occupational Therapy have increased to approximately 100 in the first year. Our graduating class in Medicine at the spring convocation on June 14 numbered 143. Graduates in the diploma course in Physical and Occupational Therapy numbered 45, in Speech Pathology 6, and in Art as Applied to Medicine 1. Postgraduate diplomas in Public Health were awarded to 19, in Industrial Health to 2, in Medical Radiology to 5, and in Psychiatry to 17.

Dean Wright of the Faculty of Law addressed Convocation at which were gathered the graduates in Law and Medicine and a very large congregation of friends and relatives of those in the graduating classes. The Medical Alumni Association had entertained both the members of the graduating class and a very large number of the class of 1911 at dinner at Hart House on the eve of graduation. This very pleasant function, followed by the combined commencement exercises for Law and Medicine on the next afternoon, has been the practice now for more than a dozen years and bids well to be a University tradition. The alumni have continued to increase the amount of bursary and scholarship aid to our students. In the past year they have provided the school with more than $7,000 in student support and have made available short-term loans for several students who needed emergency aid.

The whole question of financial aid to professional students has been the subject of much discussion both here and in the United States. In no other countries of the world is higher education for professional students so costly as in the United States and Canada. There is a considerable amount of money available through loan funds and bursaries, but its distribution to those who are most deserving presents continuing problems. In the coming year the Faculty will have the advice and part-time assistance of Mr. A. A. H. Vernon, recently retired from a responsible position with a large trust company. He will establish a financial aid office in the Medical Building where each student seeking assistance may be interviewed and a record kept from year to year of his needs and the aid which it has been possible to find for him from the various sources available.

The reports of the work of the Medical and Athletic Societies during the past year are indications of the high morale and versatility of the undergraduates in the school.

Reading again the annual reports from the various departments, one is impressed by the variety and breadth of research in which the members of the staff are engaged, and this in spite of steadily increasing responsibilities for undergraduate and postgraduate teaching, and an ever widening influence in community, national, and international medicine. Dr. Botterell and Dr. Dauphinee were invited to spend six weeks in Australia lecturing and taking part in postgraduate seminars throughout the commonwealth. Dr. Godfrey of the Department of Rehabilitation Medicine spent two months in Morocco assisting with the treatment of that unfortunate group of paralytics whose lesions resulted from adulterated cooking oil. Dr. Sinclair from the Department of Medicine spent three months in the Congo with the first Canadian Red Cross medical relief team. Dr. Hanes, the Head of our Department of Biochemistry, was invited to Russia to take part in an international conference in Moscow. Dr. W. R. Harris of the Department of Surgery was the orthopaedic visitor at Vanderbilt University in the session 1959–60.

Three members of our staff have accepted responsible positions in other medical schools in Canada. Dr. Elliot, who has in the past fifteen years made for himself and his department a national and international reputation, has accepted the Chair of Ophthalmology in his native province of British Columbia. We wish for him in his new post the sort of challenge which he is so capable of meeting and we have no doubts of his success. Dr. J. C. McCulloch, who has for several years been the Senior Ophthalmologist at the Toronto Western Hospital, has been appointed to the Chair and to the direction of the Department in the Toronto General Hospital. Dr. Harold Warwick, the head of Medicine at the Princess Margaret Hospital and

Deputy Director of the Ontario Cancer Institute, has been appointed Dean of the Faculty of Medicine in the University of Western Ontario. Since his association with our Faculty he has made many friends and has established a reputation as an excellent teacher, physician, and colleague. We wish him every success.

Miss Jane Hudson of the Department of Rehabilitation Medicine, has been invited to direct the teaching of Physiotherapy in a new school of Rehabilitation Medicine established in the University of British Columbia. We wish her every success in this new venture.

Staff

Dr. Stanley Campbell, Head of the Department of Anaesthesia, retires this session. He has developed a very strong department, embracing all the teaching hospitals and providing as well as the usual facilities for undergraduate teaching, a sound postgraduate training and research programme. The first students have been enrolled in the new course leading to a Diploma in Anaesthesia. The Head of the Department will henceforth be accorded full professorial status; Dr. R. A. Gordon, who has succeeded Dr. Campbell, was promoted to Professor and Head of the Department.

Dr. Watson and Dr. Carscadden of the Department of Surgery at St. Michael's Hospital have retired from undergraduate teaching but will of course continue in active practice and as postgraduate teachers. They have given very valuable service as teachers and as members of a great service and teaching community in St. Michael's.

The Faculty has suffered grave losses during the year in the deaths of Emeritus Professor Alan Brown, Dr. John Mann, and Dr. Ray Smith. Alan Brown is still remembered by generations of doctors who learned their paediatrics at the Sick Children's Hospital when he was the Physician-in-Chief. He did much for children in this city and indeed in this nation. It is hoped that some sort of lasting memorial will be devised to remind future generations of his contribution. John Mann and Ray Smith were both great doctors and unselfish teachers in their respective specialities of obstetrics and dermatology. Both worked for years and months in the shadow of illnesses for which they knew there was no relief, but their patients received full measure of their service, and their colleagues the brightness of their friendship until the last.

Honours

The Dean received an honorary degree of Doctor of Laws from the University of Western Ontario on October 28, 1960. He was awarded an honorary life membership in the Medical Alumni Association of the University of Toronto on June 13, 1961. Dr. S. M. Campbell was Chairman of the Programme Committee of the 2nd World Congress of Societies of Anaesthesiologists, Toronto, September 7 to 10, 1960. Dr. Alan W. Conn was appointed Anaesthetist-in-Chief to the Hospital for Sick Children. Dr. R. A. Gordon was elected President of the Defence Medical Association of Canada, Editor of the *Canadian Anaesthetists' Society Journal*, and Chairman of the Organizing Committee of the Second World Congress of Anaesthesiologists. Dr. Iain MacKay (Lt. Col. R.C.A.M.C.) was appointed Honorary A.D.C. to the Lieutenant Governor of Ontario, January 1, 1961. Dr. J. C. B. Grant has accepted an invitation from the University of California in Los Angeles, to be Visiting Professor for the first half of the session 1961–62.

Dr. O. H. Warwick has been appointed Dean of the Faculty of Medicine, University of Western Ontario. Dr. Wallace Graham was elected President of the American League Against Rheumatic Diseases. Dr. Calvin Ezrin received the Annual Award of the Canadian Society for Study of Fertility. Dr. J. S. Crawford has been appointed Chairman of the Medical Staff of Hillcrest Convalescent Hospital. Dr. J. C. Sinclair was made an Honorary Member of the Canadian Red Cross Society. Professor D. E. Cannell was elected an Honorary Fellow of the Royal Society of Medicine of London, England. Dr. A. J. Elliot was elected an Honorary Member of the Montreal

Ophthalmological Society. Dr. J. S. Speakman was awarded the 1961 Medal in Surgery of the Royal College of Physicians and Surgeons of Canada. Dr. P. E. Ireland and Dr. G. A. Henry were elected Honorary Members of the Scottish Otolaryngological Society. Dr. J. A. Sullivan was elected Vice-President and President-Elect of the American Otological Society.

Professor A. L. Chute was appointed member of the Medical Research Council of Canada. Dr. J. H. Ebbs delivered the George Frederick Still Memorial Lecture at the British Paediatric Society Meetings at Cambridge. Dr. D. Fraser received the 1961 Borden Award of the Nutrition Society of Canada. Dr. J. A. Dauphinee was invited by the Post-graduate Medical Committee of the University of Sydney to visit Australia during the summer of 1960. While he was there, he gave a series of lectures on various medical topics in Sydney and in other major centres in Australia and New Zealand. Professor G. H. W. Lucas was elected President of the Canadian Society of Forensic Science, and President of the Pharmacological Society of Canada. Professor A. C. Singleton has been made an Honorary Fellow of the Faculty of Radiologists, London. Professor C. L. Ash delivered the Janeway Lecture before the American Radium Society. Dr. N. C. Delarue was the W. H. McGuffin Memorial Lecturer to the Alberta Division of the Canadian Medical Association. Dr. Charles M. Godfrey was made an Honorary Member of the Canadian Red Cross Society in recognition of his contribution in the field of rehabilitation in Morocco. Miss Jane Hudson was elected to the Presidency of the Canadian Physiotherapy Association.

Research

The reports from the various departments give a fairly full account of the extent and variety of research carried on in the school in the past year. The dean of an American medical school is quoted recently as saying that there has been more medical research carried on in the past fifteen years than in all the previous history of medicine. Whether this is statistically correct or not, the statement indicates how important a part research must play in the everyday life of a modern medical school. We have enjoyed increasing support from national and provincial bodies in Canada as well as limited help from the National Institutes of Health in Washington. There have been several bequests. An estate of a quarter of a million dollars will provide for the establishment of research funds in each of the Departments of Medicine, Surgery, and Psychiatry. During the year an anonymous donor gave approximately one million dollars to establish a special fund for research in the diseases of the nervous system, with the first efforts of a special group of investigators to be directed towards Parkinson's disease. This tremendous gift reflects the interest of the public in sound research and the confidence of the community in the training and ability of young Canadians in our own school to undertake such difficult and important investigations.

We continue to enjoy support of various projects from the J. P. Bickell Foundation, the Atkinson Charitable Foundation and from such special groups as the National and Ontario Heart Organizations, the Canadian Arthritis and Rheumatism Association, the Muscular Dystrophy Association, the National and Provincial Cancer Organizations. The McLaughlin Foundation has supported several of our young clinical scientists while abroad engaging in some special training and research efforts before returning to take up appointments on the teaching staff. The Markle Foundation awarded a scholarship to a young neurosurgeon who has returned from 18 months of study under the McLaughlin Foundation.

A new degree, Doctor of Clinical Science, has been established in the School of Graduate Studies. This degree will be available to graduates in Medicine who look forward to a career in medical research and who would wish to maintain comparable academic status with their colleagues who have proceeded to higher qualifications in the Royal College of Physicians and Surgeons.

Buildings and Hospital Plans

Now that we have an increasing number of young men who are trained and keen on investigation we are badly hampered for lack of space. The facilities of the

Best Institute are being increased by the three floors over the lecture room which were in the original plans but which could not be completed in 1954. The Banting Institute, however, is very seriously overcrowded and totally inadequate in space for the workers and for animals. It was hoped that at an early date two new floors might be added. Now, however, it would seem wise to put another modern building on the land to the east of the Banting Institute on College Street. Negotiations are in hand for the acquisition of this land from the Government of Ontario. If priorities are to be indicated, this new building is the most pressing need in the Faculty of Medicine at the present time.

At the General Hospital a new clinical investigation unit is about to be opened in the site of the old department of physical medicine and admitting department. Already there is questioning as to whether it will afford the necessary amount of space for all the workers who are interested.

The plans for the new Psychiatric Hospital have been approved by the special committee and the architect hopes to get on with the working drawings so that contracts may be let in the late fall or early spring. The Western Hospital programme of building is proceeding according to plans; the Sick Children's is to add another 100 beds; the Princess Margaret is completing arrangements for some 30 extra beds. The Wellesley is engaged in plans for a modernization and addition from which ultimately will emerge a hospital concept particularly adapted to the needs of university teaching and training combined with ideal patient care. St. Michael's have established a joint university hospital planning committee with Sister Janet as chairman, with the objective of considering future teaching and service needs.

Visitors

An increasing number of medical scientists from other countries have visited the school. Professor Asratyan, a neurophysiologist from the Moscow Academy of Science, spent two days with us in the autumn. Other Russian visitors came on the occasion of the Third World Congress of Psychiatry in Montreal.

The Balfour Lecture was delivered by Professor Ian Aird of London; the Harry Shields by Dr. John Gillies, C.V.O., of Edinburgh; the Walter Wright by Professor Walter Fink of Minnesota; and the Phi Delta Epsilon by Dr. Homer W. Smith of New York.

Professor Sir Charles Illingworth of Glasgow visited us in the course of his trip to Canada as the first W. E. Gallie Visiting Professor; this Professorship was established under the McLaughlin Foundation.

Our Middlesex Visitor was Sir Eric Riches. Dr. Welsh, the surgeon in chief of St. Michael's Hospital, will represent our school at the Middlesex in September of this year.

With the beginning of a new academic year, Dr. John Hamilton will assume the responsibility as Dean of the Faculty. The work of the past fifteen years has been for me a stimulating and happy experience. I have had the good fortune to be associated with a group of brilliant department heads who have constantly worked together in the greatest amity for the best interests of the school. I doubt whether in any other centre one could find men of such genius, wisdom, and leadership. I acknowledge with gratefulness their loyalty, industry, and wise advice.

I have also been unusually fortunate in a secretariat, the members of which have regarded the daily duties of office administration as a pleasant and all-absorbing task. The devoted and tireless service, the grace and good cheer, the always courteous and helpful attitude of these young women to those who seek their help, have established with staff, students, and graduates a splendid tradition of friendliness and efficiency. I am personally greatly indebted to them for their help through the years. It is with the utmost confidence that I look forward to the future of the School under the very capable direction of the new Dean.

J. A. MacFarlane

Publications

MacFarlane, J. A. "Medical Education: Prospects and Problems" (*Ontario Medical Review*, vol. 28, no. 1, April, 1961, pp. 270–3).
——— "Medical School and Teaching Hospital" (*Canadian Medical Association Journal*, vol. 84, no. 13, April 1, 1961, pp. 683–6).
——— "Medicine, Law and the University" (*ibid.*, vol. 84, no. 1, Jan. 1, 1961, pp. 35–7).
——— "University of Toronto Faculty of Medicine" (*ibid.*, vol. 84, no. 13, April 1, 1961, pp. 727–8).

DIVISION OF POSTGRADUATE MEDICAL EDUCATION

Under the direction of Professor R. Ian Macdonald

Three hundred and eighty-six graduate students were registered with the Division for full time work in different departments and 806 were enrolled in special short courses offered during the session. A total of 1,192 represents an increase of 410 over the comparable figure for the 1959–60 session and can be taken as an indication both of the increase in demand for graduate and postgraduate training and of the expansion of facilities provided for it by this Faculty.

In addition to those who registered for intramural instruction there were a large number of doctors in eleven centres in Ontario who attended, in their own hospitals, clinics for which the University of Toronto provided the teachers.

The full-time students included those registered in the different diploma courses, in B.Sc. (Med.), and in the sessional courses as well as those internes working in the different university hospitals under the active and continued supervision of university staff.

It is perhaps appropriate to draw attention to the graduate group registered as internes. There were 233 in this special group which includes senior internes, assistant residents, residents, and fellows; it is clear that while they contribute a great deal to the work of the hospitals and departments with which they are associated they are enabled to do so because of the close supervision and teaching which they receive continuously from Faculty members. Indeed, there is good reason to believe that the amount of Faculty time and thought devoted to the teaching of this group compares favourably with that given in other faculties and schools. In addition to the day-to-day teaching in wards, operating rooms, clinics, and laboratories, additional instruction has been arranged to meet the special needs of the different groups of graduate students. Regular series of lectures were given during the year for graduate students in Medicine, Surgery, Urology, Obstetrics and Gynaecology, Otolaryngology, Ophthalmology and Anaesthesia; and the Departments of Anatomy and Pathology gave courses and lectures adapted to the special interests of the different groups. All these special classes were arranged at hours least likely to conflict with hospital and departmental responsibilities.

Advanced graduate courses in Medicine, Surgery, and Obstetrics and Gynaecology which have been offered by the Faculty for a number of years were given over a six weeks' period in August and September 1960. Seventy-two graduates at an advanced stage in their training were registered for these courses. Instruction was organized to give the student a critical appreciation of the field in which his particular interests lay and it is believed that the objective was achieved.

Seven hundred and eight doctors active in practice registered for a number of courses given during the year in Toronto. These special courses were designed to meet the varying needs of men in practice. Some were specialized and restricted and others were more general. In each instance the department responsible for the organization and conduct of the course drew upon other departments as necessary; and the ready co-operation between departments was of great assistance. The special courses offered were: Anaesthesia, 31; Rheumatic Diseases, 71; Surgery for General Practi-

tioners, 34; Clinical Paediatrics, 41; Office Orthopaedics, 124; General Surgery, 80; Public Health Refresher, 64; Industrial Medicine, 24; Fractures and Trauma, 9; Eye Surgery, 53; Cardio-Vascular Disease, 119; Otolaryngology, 38; and Radioactive Isotopes, 20.

The Faculty was privileged to co-operate with the Medical Alumni Association of the University of Toronto in providing a number of teachers for the Fifteenth Annual Graduate Meeting held over three days in October 1960. The theme was "Current Therapy" and it was developed through lectures and round table discussions at Sunnybrook Hospital and clinical demonstrations at Sunnybrook Hospital and at the Toronto General Hospital. Some two hundred and fifty doctors active in practice attended this very well organized course devoted to an important aspect of practice. An important occasion during the course was the delivery of the Fifth Annual Medical Alumni Oration by Professor R. F. Farquharson, Emeritus Professor of Medicine in the University and Chairman of the Medical Research Council of Canada, who spoke on "Medicine and Science in Russia."

Decentralized clinics were held in eleven centres in Ontario where twenty-six clinical days involving fifty-three teachers were held. Special clinics in cardio-vascular disease were held in three centres and six teachers took part in the instruction. The majority of these extramural clinics were very well attended by the members of the profession in the areas visited, as well as by the doctors in the neighbouring areas. This has continued to be a very useful contribution of the University to postgraduate education particularly as the teaching is taken to the home area of doctors in active practice.

During the year the Division continued to co-operate with the Education Committee of the Ontario Medical Association.

DIVISION OF REHABILITATION MEDICINE

Under the direction of Dr. A. T. Jousse

At the graduation exercises in May, 45 young women received diplomas in Physical and Occupational Therapy. On the same occasion six candidates graduated in the Diploma Course of Speech Pathology and Audiology. It is hoped that an increase in registration will utilize more fully the facilities of this division, for the numbers graduating are approximately half the number we are now able to enrol.

During the year, Dr. C. M. Godfrey travelled to Morocco where for two months he directed a programme of treatment for Moroccans who suffered paralysis following the ingestion of a toxic oil. This programme was under the direction of the International Red Cross Society. In recognition of his services he was made an honorary member of the International Red Cross Society.

Miss Jane Hudson, lecturer in Physiotherapy for the past five years, has resigned in order to assume the responsibility of instructing in Physical Therapy in the new course of training being initiated in Vancouver in the autumn of 1961. This new course will provide a training programme designed to produce rehabilitation therapists. During Miss Hudson's career at the University of Toronto, she has established a reputation as a fine teacher and a delightful associate which will long be remembered. She takes with her our best wishes for her future success at the University of British Columbia.

Mrs. Wilma Brown has completed her credits and graduated with the degree of Bachelor of Arts. This represents an accomplishment of considerable magnitude for she has studied winter and summer while carrying the onerous duties of a member of the teaching staff.

Miss Ruth Bradshaw, who has been on leave of absence for two years, at McGill, has this year completed her course and been granted a Bachelor of Science degree. She will return to Toronto and continue her teaching duties.

The Division of Rehabilitation Medicine has been responsible for the organization and administration of a Speech Clinic at the Princess Margaret Hospital. This Clinic is concerned primarily with teaching oesophageal speech to patients who have undergone laryngectomies. The Division has also been responsible for the organization of a Prosthetics Department and for procuring the services of a prosthetist who will work in the Princess Margaret Hospital. He will provide prostheses to patients who have suffered functional and anatomical impairment of the body as a consequence of the ravages of cancer.

The Division provided the organizational impetus for the setting up of a Speech and Hard of Hearing Clinic in the Windsor area under the sponsorship of the local Service Organization.

Mrs. Thelma Cardwell attended the World Federation of Occupational Therapists' council meeting in Sydney, Australia. Mrs. Cardwell is Secretary-Treasurer of the Federation. While in Sydney, she presented a paper, "Assessment of the Injured Workman," to the Federal Conference of the Australian Association of Occupational Therapists.

Publications

Godfrey, C. M. "A Canadian Doctor in Morocco" (*Toronto East Medical Association Journal*, vol. 26, no. 3, May, 1961).

Godfrey, C. M. and Lawson, G. A. "Clinical Study in Isometric Exercise" (*Medical Services Journal*, vol. 66, no. 9, Oct., 1960, pp. 804–8).

Jousse, A. T. "Rehabilitation in Paraplegia" (Film) (*Department of Veterans Affairs Film Library, Toronto*, 1961).

LeVesconte, H. P. *Guideposts of Occupational Therapy*. Toronto: University of Toronto Press, 1959; Oxford: University of Oxford Press, 1960. Pp. 60.

——— "William Rush Dunton Jr., Pioneer in Rehabilitation Medicine" (*American Journal of Psychiatry*, vol. 117, no. 8, Feb., 1961, pp. 751–2).

MEDICAL SOCIETY

(September 1960, to June 1961)

Honorary President	Dean J. A. MacFarlane
Honorary Secretary-Treasurer	Dr. W. J. Horsey
Chairman	Dr. W. Hunter
President	R. S. Bush
Vice-President	F. Lewis
Treasurer	J. Cullen
Secretary	J. Macklin

This has been an interesting year—one which has seen the start of a new club; a big change in the *Medical Journal*; new furniture for the Duncan Room; the rebirth of a Medical Society Awards Dinner, and a reasonable amount of interest and contribution of time and effort from the student body as a whole. The Medical Assembly, the governing body of the Society, had regular, well-attended, and lively meetings under the chairmanship of Dr. William Hunter. His control of meetings and advice when requested, earned a unanimous vote of thanks at the end of the year.

The new club formed this year was the Foreign Language Club, organized under the auspices of the Arts and Letters Club. Conversational French lessons were held regularly by Gary Goldthorpe. The Arts and Letters Club itself has only a small but faithful following in this Faculty. Perhaps more than any other Society activity, this club suffers from the fact that so few of the members live in residence. However, the annual Art and Photography contest shows that many medical students are active in those two fields, and surely "Daffydil" itself is the greatest advertisement of the writing and musical ability of this faculty of students—though at times one might debate "Daffydil" 's cultural worth! This year, "Daffydil" was again both original and a great success, thanks to the efforts of many within the Society. Here, if anywhere, one

can see the satisfaction which comes from having contributed some time and effort to a Society venture.

The editor-in-chief of the *Medical Journal*, L. E. Soper, made many changes in his charge. The most apparent was the format of the *Journal*—a change which was very well received, much to the satisfaction of the editor-in-chief and of course to the Medical Assembly. The copies of old woodcut prints which were used as frontispieces have been excellent, both in their appearance and in the possible stimulation of students to interest themselves in medical history. Though there has been the occasional difficulty in printing, individual articles have often been outstanding, and always up to the standard established by this *Journal*. The less apparent changes were made in the book-keeping associated with the *Journal*. These changes, together with an increase in advertising rates, should prevent the development of debts, known and unknown, as has happened occasionally in the past. One of the greatest satisfactions of this year's editor was the large number of volunteers from all years whose spirit was amazing. As in "Daffydil," this spirit was rewarded with an excellent production.

The Duncan Room was the scene of great changes in the summer of 1960. David Appert, the Warden, bought new furniture from the proceeds obtained from the daily coffee and bun sales. This furniture has managed to withstand reasonably well the battering of the past year. The Duncan Room receives a tremendous amount of use both day and night. During the day, it appears to be used by most of the campus. At night, various Medical Society clubs use it, and of course the Medical Assembly hold regular meetings there. It is a pity that the room is so noisy during the day that it is all but impossible to do any reading there. The Medical Assembly hoped to start a small browsing library this year in the Medical building, but space and money were not available. We hope this can be accomplished in the future.

In the spring of this year, the Medical Assembly organized a Medical Awards Dinner. In the past few years, the Medical Assembly and the Medical Athletic Association had held separate functions at which annual awards were presented. Peter Wyshynski, President of the M.A.A., suggested the amalgamation of the two dinners, and it was the new President, Barry Cutler, who did so much towards making it a success. Although only a limited number of invitations were sent out this year, it is hoped that in the future the banquet will attract many in the Medical Society. We were fortunate in having Dr. Wynne attending the dinner, and thus had the opportunity to present him with a small token of our appreciation for the years he has spent assisting medical students to acquire some knowledge of biochemistry.

C.A.M.S.I. has been very prominent in the year's activities. Miss J. Shkimba has been a capable and popular C.A.M.S.I. representative and has worked very hard in her position. She has been well-supported by the other local officers. Unfortunately, she was caught in the cross-fire from her own Medical Assembly and the National C.A.M.S.I. executive, owing to an argument between these two bodies. The argument developed when Toronto objected to a change in C.A.M.S.I. policy being made without general assent. Soon the argument was nation-wide, with the majority of the Medical Schools supporting Toronto. It was a good battle which stimulated much interesting debate in our own Assembly and helped to bring C.A.M.S.I. forcefully before the Medical Society. Early in the New Year, C.A.M.S.I. and the Medical Assembly organized a debate on Socialized Medicine. Dr. Wodehouse and Dr. Nathan spoke against, while Dr. Bodrug and Mr. Goldberg, of the United Steel Workers of America, spoke for a compulsory Government-sponsored plan. This debate was excellent and very well attended.

Social functions during the year met with both success and failure. Gary Ashby organized an excellent reception for the Freshmen at the start of the year. A highlight was the Freshman Banquet at which Principal Woodside spoke. His speech was so impressive that *Probe* printed it in full for the benefit of the whole Medical Society. In the fall, the Medical Assembly ran a dance in conjunction with the P. & O.T. students. This really was an enjoyable affair in Hart House, but, as in the preceding few years, it was a financial failure. There are so many campus dances at that time of the year that it is really unnecessary for the Medical Society to try to hold one.

The At-Home was a great success, both socially and financially. Frank Lewis worked extremely hard, as did his committee of class presidents, and was rewarded with compliments from all who attended.

There are many other activities in which the Medical Assembly members are involved. Representatives on campus organizations such as S.A.C., N.F.C.U.S., and W.U.S. have all taken a full and important role during the year. The Staff-Student committee is still playing an active part in trying to offer constructive criticism of the educational programme. The Medical Athletic Association and Medical Women's Undergraduate Association each have their own account in this Report.

The last, but by no means least, Assembly function to be mentioned here is that of the budget. Jim Cullen, the Treasurer, has made a great attempt this year to stay within the money available and not go into debit financing. The Assembly as a whole has supported him and only two editions of *Probe* were published instead of the usual four because of insufficient funds. With good book-keeping and the support of all members, even with the loss on the fall dance and several other unexpected expenditures, the books have been balanced.

The Medical Alumni Association plays an important role in the life of many medical students. Its main contribution lies in the support it offers to individuals by means of scholarships, loans, bursaries, but it also sponsors the General Practice Forum and the Graduation Banquet for the fourth medical year.

In closing this report, I wish to thank Dean MacFarlane and Dr. Horsey for the interest they have shown in our activities. It is with great regret that we all heard of the retirement of Dean MacFarlane. Each of the medical years presented him with a tree for his Caledon Hills farm and trust that these will flourish and grow under his care as a symbol of the growth we have achieved under his expert and loving guidance.

My sincere appreciation goes out to all members of the Medical Assembly and the Society for the support given me during the year. A report is not sufficient to record all the names of people who have contributed even considerable amounts of time and effort to the student life. However, these efforts have borne fruit in an admirable year and I trust that this will assist the new Assembly in their endeavours. To the new President, Frank Lewis, I wish every success.

R. S. Bush

MEDICAL ATHLETIC ASSOCIATION

(September 1960 to June 1961)

Honorary President	Dr. J. A. Sullivan
President	P. E. Wyshynski
Vice-President	J. G. Anderson
Secretary-Treasurer	H. H. Paterson
Publicity Director	B. K. Cutler
Quartermasters	J. A. Zadiyko
	D. M. Birch
IV Medical Representative	J. R. Hodgkinson
III Medical Representative	T. C. Gibson
II Medical Representative	P. A. Kopplin
I Medical Representative	P. D. Chubb
II Premedical Representative	W. M. Easterbrook
I Premedical Representative	U. V. Aasoja

This year, as in the past, the Medical Athletic Association has tried to stimulate interest and participation in athletics in the hope of increasing Faculty and University unity, as well as providing more relaxation and exercise for the students. At this University, where great emphasis is placed on the academic programme, a counterbalance of physical activities is provided by the intramural athletic programme.

In golf, H. H. Paterson (2nd Meds) won the University Golf Championship and then went on to Kingston to win the Canadian Intercollegiate Athletic Conference

and the Ontario-Quebec Athletic Association championships. The Staff-Student Golf Tournament held this year in October at the Tam O'Shanter Golf Club was a great success despite a meagre turnout. Dr. Burton of the Toronto General Hospital, won the staff low gross and H. H. Paterson (2nd Meds) won the student low gross. In tennis, J. G. Anderson (3rd Meds) won the University Men's Singles Championship for the fifth consecutive year. Medicine tied with Victoria for the team honours. A. Toi (1st Meds) won the Intramural Track Championship.

Despite fine coaching by J. E. Graham and C. F. Snelling the football team made a poor showing this year. In soccer, two teams were fielded. Senior Meds won its division title but lost to SPS in the finals. In lacrosse, three teams were entered with Premeds II winning its division title but losing to SPS in the finals. In volleyball six teams were fielded and three reached the playoffs, with Meds III losing in the finals. In hockey, four teams were entered. Senior Meds, coached by S. R. McNeill of 1st Meds and recently of the Detroit Red Wings, advanced to the semi-finals but lost to SPS. There were eighteen teams in basketball and in waterpolo five teams. Three of the latter reached the play-offs where Meds I lost to SPS in the finals after eliminating Meds IV in the semi-finals.

Awards

P. E. Wyshynski (4th Meds) was awarded the Athletic Stick, as the student in the graduating year judged by his classmates to have contributed most to athletics. J. R. Hodgkinson (4th Meds), B. K. Cutler (3rd Meds), and J. G. Anderson (3rd Meds) were awarded Executive Keys. J. G. Anderson and H. H. Paterson were nominated for the R. E. Biggs Trophy, presented to the outstanding athlete of the year in the University. D. Berger (4th Meds) was the Faculty nominee for the Sidney Earle Smith Award given to the graduating student in the University who contributes most to intramural athletics.

This year two remarkable feats were accomplished. The Treasurer for the first time in many years was able to balance the budget and report a small surplus for the year rather than the usual large deficit. The Quartermasters completed a full inventory of all of the Association's property.

In a departure from the traditional Athletic Banquet, the Athletic Association joined with the Medical Society this year to hold the Faculty Awards Dinner at Hart House on March 24. Senator J. A. Sullivan, Honorary President of the Athletic Association, and Dr. W. J. Horsey, Honorary Secretary-Treasurer of the Medical Society were the principal speakers. The event proved a success both as a social event and as an attempt to bolster undergraduate interest and *esprit de corps*.

I should like to express my sincere appreciation to all the members of my executive for the support given me this past year. I wish Barry Cutler and his new executive every success and hope they will enjoy the same co-operation and eagerness which existed this past year.

PETER E. WYSHYNSKI

MEDICAL WOMEN'S UNDERGRADUATE ASSOCIATION

(September 1960 to June 1961)

Honorary President	Dr. Ruth Sky
President	Beverley Nelems
Vice-President	Lavina Lickley
S.A.C. Representative	Judy Heard
Treasurer	Kay Moses
Secretary	Linda Geiger
Social Convenor	Kathy Boland
1 Premedical Representative	Helen Nicowski

The activities of the association commenced this year with the new members being welcomed at a tea held at Lavina Lickley's home. This is an annual event

given by the graduating class and the M.W.U.A. executive and is a most useful opportunity to introduce the newcomers to the various facets of the faculty.

The initiation banquet was held, once again, at the Town and Country Restaurant and we were pleased to have Dr. William Paul as our guest speaker. His talk and film on "The Ungulata" illustrating his experimental work on uterine and placental physiology, was delightful.

At Christmas-time each year a supper party is held to which the girls bring small gifts to be given to the children at the University Settlement House. This year over sixty gifts were donated by the women of the faculty to six-year-old girls and boys.

The second Annual General Meeting of the M.W.U.A. was held at the time of the Christmas party. The Constitution of the Association was revised this year for incorporation with the revised edition of that of the Medical Society.

One of the most interesting and valuable associations we have as women undergraduates in the Faculty of Medicine is with women doctors, and we do appreciate their interest in us. Members of the Ontario branch of the Federation of Medical Women in Canada entertained us at a tea at Women's College Hospital in the fall and gave a most enjoyable dinner for the graduating class this spring. In February a forum of doctors, under the auspices of the Medical Alumni Association, spoke to us about their various areas of interest. The speakers were Dr. Ruth Sky, general practitioner; Dr. Lois Lloyd, ophthalmologist; Dr. Vera Peters, radiotherapist; Dr. Shirley Fleming, anaesthetist, all of whom were able to impart to us much useful information with regard to postgraduate work in these fields. Most enjoyable was the time spent in informal discussion over coffee.

We were most fortunate to have the enthusiastic encouragement of Dr. Ruth Sky, our Honorary President throughout the year. Dr. Sky was not only present at all our functions, but was also a most gracious hostess at the farewell party for the graduating class, which she had at her home.

Attendance by members of the Association was excellent on all occasions this year, the girls displaying considerable interest in the activities. I do wish to thank the members of the 1960–61 executive most sincerely for the part they played in engendering this interest and for their unfailing eagerness to help me throughout the year. I hope that the new executive under Marilou Waite will find its task as enjoyable and worthwhile next year as we have found it to be this year.

BEVERLEY NELEMS

MEDICAL WOMEN'S UNDERGRADUATE ATHLETIC ASSOCIATION

(September 1960 to June 1961)

President	Ann Cuddy
Vice-President	Lynn Fredericks
Treasurer	René Silverstein
Secretary	Nadine Hradsky

In the past year Medicine as usual entered teams for competition in the four major intramural sports—baseball, basketball, hockey, and volleyball. Participation in sports was extremely good in the First Premedical year, although somewhat less from the more senior years.

Medicine made an excellent showing in volleyball, reaching the intramural finals where they were defeated by P. & H.E. In hockey, the most popular sport of the year, Medicine came second in their league. The basketball team, with four wins and two losses, reached second place in their league also. The baseball league was on the whole very apathetic with many games defaulted by various faculties. It is hoped that next year a better schedule may be worked out so that these difficulties may be overcome.

In intercollegiate athletics Medicine had one player on the archery team and one on the senior intercollegiate volleyball team.

The close of our athletic year came with the annual banquet at Kwongchow Chop Suey House. We were very pleased to have about fifty from the Faculty in attendance. The guest speaker was Dr. G. Pearson whose talk on "Fly Fishing" was most enjoyable. Three Premedical Bars and one Medical "M" were awarded, as well as the University awards of one Junior "T," one citation to Junior "T," two Senior "T" 's, and one Silver "T."

I should like to thank the executive for their assistance during the past two years and to wish future Medical teams every success.

ANN CUDDY

SCIENCE AND MEDICINE DIVISION OF THE UNIVERSITY LIBRARY

Reported by Mrs. M. Galt

There has been a substantial increase this year in the circulation of books and periodicals classified as medical. A breakdown of this increase shows that borrowing by students has increased 9 per cent, by staff and graduates 22 per cent, and borrowing of current periodicals 65 per cent.

In order to facilitate the research in neuropathology, cardiology, and medical biophysics, 27 new journals have been ordered. Subscriptions to three Russian surgical journals have also been placed.

REPORT ON REGISTRATION, SESSION 1961–2

First premedical year	138
Second premedical year	125
First medical year	152
Second medical year	143
Third medical year	149
Fourth medical year	150
Special students	4
Art as Applied to Medicine	2
Bachelor of Science (Medicine)	3
Diploma in Medical Radiology	15
Diploma in Psychiatry	49
Diploma in Public Health	23
Diploma in Industrial Health	0
Diploma in Anaesthesia	7
Advanced Graduate Courses	71
Graduate students	236
Physical and Occupational Therapy	232
Speech Pathology and Audiology	14
Student Teachers	3
Occasionals (special students)	4
	1,520

FELLOWSHIPS, SCHOLARSHIPS, MEDALS, AND PRIZES

Awarded at Convocation, June 1961

GRADUATE

Graham Campbell Prize	R. Lee, M.D.
Canadian National Institute for the Blind Fellowships	G. M. Cobb, M.D., C.M. (Dal.) J. D. Morin, M.D.
W. P. Caven Memorial Fellowships	M. Gold, B.A. C. Chou, B.Sc., M.D., M.Sc.
Elizabeth Arbuthnot Dyson Fellowship	M. Braudo, M.B., Ch.B. (Wit.), D.C.H. (Lond.), M.R.C.P. (Edin.)

William Goldie Prize	W. B. Spaulding, M.D., F.R.C.P. (C)
Stuart Alan Hoffman Memorial Prize	B. Tobe, B.A., M.D.
Arch Hutchison Fellowship	R. Volpe, M.D., F.R.C.P. (C)
Frances Esther Hutchison Fellowship	J. R. Wherrett, M.D., C.M.(Qu.)
Interlake Research Award	M. G. Williams, M.D. (Man.), M.R.C.P. (Edin.)
Minister of Health Gold Medal	R. C. Cochrane, M.B., B.S. (Lond.) *Aeq.* L. W. Woods, M.D.
O'Keefe Fellowships in Oto-Laryngology	W. H. Johnson, B.Sc., Ph.D. J. Farkashidy, M.D.
James H. Richardson Research Fellowship	E. J. MacFarlane, M.B., Ch.B. (Glas.)
Starr Medals	R. K. Murray, M.B., Ch.B. (Glas.), M.S. (Mich.) J. W. Steiner, M.D. (Prague, Liv.) J. E. Anderson, M.D.
John Alexander Stewart Fellowship	J. R. Wherrett, M.D., C.M. (Qu.)
Helen L. Vanderveer Fellowship	M. G. Norman, M.D.

Undergraduate

Fourth Medical Year

Cody Gold Medal	L. M. Jerry
Cody Silver Medal	H. N. Singer
Cody Silver Medal	C. H. Tator
Dr. Benjamin W. Appleton Prize in Psychiatry	B. W. Merrick
Butterworth Prize	R. S. Bush
J. P. Boley Prize in Ophthalmology	M. Sazant
Chappell Prize in Clinical Surgery	L. M. Jerry
Dr. Jacob Goldstein Scholarship in Obstetrics and Gynaecology	R. K. Gill
Hendry Memorial Scholarship	W. N. Dale
Medical Alumni Association Scholarship	Miss B. G. Nelems
Medical Alumni Association Prize	J. R. Allen
Ellen Mickle Fellowship	L. M. Jerry
Ontario Medical Association Prize in Preventive Medicine	C. H. Tator
Dr. Roy Simpson Scholarship in Paediatrics	L. M. Jerry
Starkman Memorial Scholarship in Medicine	L. M. Jerry

Third Medical Year

Class of Medicine 1924 War Service Scholarship	J. J. Greisman
Franckel Memorial Award	Mrs. E. F. Borins
J. F. Hartz Company Prize in Ophthalmology	J. D. Hunt
J. F. Hartz Company Prize in Oto-Laryngology	Mrs. E. F. Borins
Frank W. Horner Gold Medal in Paediatrics	M. H. Lipson
Samuel Rotman Scholarship	M. H. Lipson
Starkman Memorial Prize in Pharmacology and Therapeutics	I. Lipton
Starkman Memorial Scholarship in Public Health and Preventive Medicine	D. A. Dotten

Second Medical Year

John Copp Bursary	H. R. D. Galway
Plaza Drug Store Scholarship	R. Baumal
Posluns Brothers Scholarship	R. Baumal
Sandoz Prize in Pharmacology	R. Baumal

First Medical Year

Starkman Memorial Scholarship in Anatomy	M. Singer
John Zoberman Scholarship	M. Singer

Second Premedical Year

Famous Players Canadian Corporation Scholarship	M. N. Kroch

ANAESTHESIA

Under the direction of Professor S. M. Campbell

The undergraduate teaching has followed a similar pattern to that outlined in the previous year's report with seven lectures given in the third year and clinical anaesthesia taught in the third and fourth years. There has been some misgiving regarding the value of presenting detail of anaesthetic drugs and techniques in seven lectures in the third year and it is suggested that the lecture series deal to a greater extent with history and theories of anaesthesia, pharmacology and physiology related to anaesthesia, with more reliance placed on text books for detail since teaching the practice of anaesthesia has become a postgraduate responsibility.

Postgraduate teaching has been carried out with 31 graduates (10 in the third year, 12 in the second and 9 in the first) under training for certification and Fellowship of the Royal College. In addition Dr. Ray Neill has been working in the Acute Respiratory Deficiency Treatment Unit at the Toronto General Hospital under a Fellowship financed by the Rehabilitation Foundation for poliomyelitics and the orthopaedically disabled.

The tutorial method of postgraduate teaching inaugurated last year has proven most satisfactory, both to the trainee and to the Department, and I want to express special thanks and appreciation to those carrying out this intensive method of teaching. Postgraduate students have come from the British Isles, China, India, Italy, Korea, the Philippines, and Turkey.

The publicity given the establishment of a three year Diploma Course created much interest and many enquiries. Seven applicants were accepted for the first class, which commenced July 1.

Many visitors came to the Department in September because of the meeting in Toronto of the Second World Congress of Anaesthesiologists. The second Harry Shields Lecture entitled, "Clinical Medicine and Surgery in Anaesthetic Practice" was given at this time by Dr. John Gillies, C.V.O., M.C., the James Y. Simpson Reader in Anaesthetics at Edinburgh University. The lecture was honoured by the attendance of the Lieutenant Governor of the Province.

On the retirement of Dr. C. Ivan Junkin from the position of Chief Anaesthetist of the Hospital for Sick Children on June 30, 1960, Dr. Alan Conn was appointed to that position and was promoted Associate in the Department. We welcome Dr. Conn to this most important position which he is well fitted to fill.

Dr. Brian Marshall and Dr. Raymond Matthews at the Toronto General Hospital and Dr. Swan at the Hospital for Sick Children obtained Fellowships in the Royal College of Physicians of Canada with Certification in Anaesthesia.

A film in colour entitled, "Epidural Anaesthesia in Obstetrics," for which Chetwynd Films were awarded the prize for the best educational film produced in Canada in 1960, was made under the supervision of Dr. R. A. Gordon and Dr. James H. Kerr at the Toronto General Hospital.

On July 1, 1961, Dr. R. A. Gordon became Chief Anaesthetist at the Toronto General Hospital and Head of the Department of Anaesthesia in this Faculty with rank of Professor, for the first time placing this department on an equal professorial basis with other clinical departments. It is of considerable satisfaction to me on retiring to see this acknowledgement of the place of anaesthesia in the medical specialties in this university. Under Professor Gordon the Department will make greater advances, especially in Research and he has my sincere good wishes and hopes for a very brilliant future.

I wish to express my thanks to the members of the department, to all the other teaching departments, to the Director and Secretary of the Postgraduate Division and especially to Dean MacFarlane, his secretary and office staff for all the assistance and co-operation given to me during the nine years of my incumbency.

The following addresses were given outside the University: Dr. S. M. Campbell,

"Choice of Anaesthetic for Upper Abdominal Surgery in a Patient with Severe Pulmonary or Cardiovascular Disease," Panel Discussion, Queen's University, Kingston. Dr. A. W. Conn, "Anaesthesia with Hypothermia for Open Heart Surgery in Children," to the Second World Congress of Anaesthesiologists, Toronto. Dr. H. B. Fairley, "The Toronto General Hospital Respiratory Treatment Unit," to the Second World Congress of Anaesthesiologists, Toronto; "Acid Base Balance and Ventilation in the Immediate Post Operative Period," to the British Columbia Division of the Canadian Anaesthetists' Society, Vancouver; "Ventilation and Anaesthesia" and "Respiratory Insufficiency," to the Post Graduate Course in Anaesthesia at the University of British Columbia; "Closed Chest Cardiac Massage," in a panel discussion at the annual meeting of the Canadian Anaesthetists' Society, Montebello, Quebec; "Problems in the Management of Respiratory Insufficiency," at Queen's University. Dr. Shirley Fleming, "Present Day Anaesthesia in Obstetrics," to the Public Health Nurses Refresher Course, Province of Ontario Department of Health, Toronto. Dr. R. A. Gordon, "Problems in Anaesthesia for Pulmonary Resection," at the annual meeting of the Western Divisions of the Canadian Anaesthetists' Society, Winnipeg. Dr. C. I. Junkin, "Anaesthesia for Surgery During the Neo Natal Period," to the North East Scotland Society of Anaesthetists at Aberdeen and to the Oslo Anaesthetic Society, Norway. Dr. James H. Kerr, "Epidural Anaesthesia in Obstetrics," a film presented at the Congress of the International Research Society, Houston, Texas. Dr. Iain MacKay, "Technique—Pros and Cons of Block Anaesthesia of Nerves of the Arm," to the Section of Anaesthesia, Ontario Medical Association, Toronto. Dr. Brian Marshall, "Physiological Aspects of Artificial Respiration," to the Section of Public Health, Academy of Medicine, Toronto. Dr. Code Smith, "Anaesthesia for Cardiac Catheterization," to the Refresher Course of the American Society of Anesthesiologists, New York; "Study on the Bifurcation of the Trachea in Infancy" and "Advantages and Disadvantages of Fluothane," Panel Discussion, at the International Anesthesia Research Society, Houston, Texas; "Practical Pharmacology of Premedication," to the Annual Meeting of Canadian Anaesthetists' Society, Montebello, Quebec. Dr. Foster Smith, "Anaesthesia Today," to the Workers Educational Association, Toronto.

Research

Members of the staff have carried out the following projects.

Dr. H. Barrie Fairley completed the study on acid-base balance in relation to anaesthesia and surgery, commenced last year.

Dr. R. A. Gordon and Dr. James Kerr have been carrying out a comparative study of four local anaesthetic drugs in epidural anaesthesia for obstetrics. This work is not completed.

Dr. R. A. Gordon is continuing a study on the use of regional anaesthetic techniques in the relief of intractable pain.

Dr. James Kerr continued pulmonary studies in pregnancy under a National Health Grant which was terminated on March 31 owing to scarcity of clinical material. However, with the offered co-operation of the Department of Anaesthesia at the Royal Victoria Hospital, Montreal, it will probably be possible to resume this study next year.

Dr. Iain MacKay has been carrying out a clinical trial of Methoxyflurane (Penthrane); and a preliminary investigation of audio-analgesia with instruments supplied by Philips Electronics Industries Ltd.

Dr. Brian Marshall in association with the Department of Neurosurgery is continuing a study of Hypothermia under a National Health Grant and also a study of the diffusion and excretion of intravenous urea under a grant from the supplier of Ureavert.

Dr. Raymond Matthews is carrying out an evaluation of the clinical use of the diethyl amide of vanillic acid (Emivan) as an arousal agent in unconsciousness due

to drugs, anaesthetic agents, and carbon dioxide narcosis, under a grant from the Arlington-Funk Laboratories.

Publications

Conn, A. W. "Anaesthesia with Hypothermia for Open Heart Surgery in Children" (*Canadian Anaesthetists' Society Journal*, vol. 8, no. 2, March, 1961, pp. 128–35).

Conn, A. W. and Millar, R. A. "Post Occlusion Hypertension and Plasma Catecholamine Levels (*Canadian Anaesthetists' Society Journal*, vol. 7, no. 4, Oct., 1960, pp. 443–6).

Dunn, A. J. "An Adaptation of the Heidbrink Trichlorethylene Circuit for Paediatric Ether Anaesthesia" (*Canadian Anaesthetists' Society Journal*, vol. 7, no. 3, July, 1960, pp. 345–9).

Fairley, H. B. "Metabolism in Hypothermia" (*British Medical Bulletin*, vol. 17, no. 1, Jan., 1961, pp. 52–5).

Fairley, H. B. and Chambers, R. A. "The Management of the Patient with Respiratory Insufficiency" (*Canadian Anaesthetists' Society Journal*, vol. 7, no. 4, Oct., 1960, pp. 447–89).

Gordon, R. A., Kerr, J. and Taylor, R. "A Laboratory and Clinical Evaluation of Mepivacaine (Carbocaine)" (*Canadian Anaesthetists' Society Journal*, vol. 7, no. 3, July, 1960, pp. 290–5).

Gordon, R. A. and Rogers, J. W. "Obstruction of the Airway in the Newborn by Aspiration of Foetal Membrane: A Case Report" (*Canadian Anaesthetists' Society Journal*, vol. 7, no. 3, July, 1960, pp. 343–4).

ANATOMY

Under the direction of Professor J. W. A. Duckworth

During the year 1960–61 there were 936 undergraduate and graduate students working in the Department of Anatomy. They were distributed among 32 different courses mentioned below, as follows:

Undergraduate Courses in Anatomy

1.	Medical, first year	149
	Teachers' Course, Physical and Occupational Therapy	1
2.	Dental, first year	113
3.	Physical Anthropology, Premedical, first year	71
4.	Physical Anthropology, Honours Course, 3C	10
5.	Physical and Occupational Therapy, first year	96
6.	Physical and Occupational Therapy, second year	56
7.	Physical and Occupational Therapy, third year	47
8.	Physical and Health Education, second year	47
9.	Physical and Health Education, third year	61
10.	Dental Hygiene, first year	21
11.	Speech Pathology	10
12.	School of Embalming, first year	58
13.	School of Embalming, second year	54
		794

Graduate Courses in Anatomy

14.	Surgery	6
15.	Radiology	8
16.	Anaesthesia	13
17.	Neuro-Anatomy	17
18.	Obstetrics and Gynaecology	11
19.	Ophthalmology	5
20.	Otolaryngology	11
21.	Dental Anatomy	10
22.	Physical Anthropology, Course 1002	7
23.	Physical Anthropology, Course Anatomy 6 (3 candidates also in item 22)	1
24.	Demonstrators in Gross Anatomy	2
25.	Advanced Graduate course in Surgery (summer)	18
26.	Advanced Graduate Course in Obstetrics and Gynaecology (summer)	14
		121

UNDERGRADUATE COURSES IN MICROSCOPIC ANATOMY		
27. Medical, first year (included in item 1)	149	
28. Dental, first year (included in item 2)	113	
29. Physical and Occupational Therapy, first year (incl. in item 5)	96	
GRADUATE COURSES IN MICROSCOPIC ANATOMY		
30. Dental Histology	9	
31. Histology	9	
32. Special Cytology	3	
		21
TOTAL		936

During the year 1960–61 arrangements were completed for the transfer of the teaching of neuro-anatomy to the first three months of the second medical year, while the time in the first medical year left vacant was taken up by the Department of Physiology. These changes will result in improved integration in the courses in Neuro-anatomy and Neuropathology.

Following the resignation of Dr. D. L. J. Bilbey on his appointment as Reader in Anatomy at King's College Medical School, London, England, Dr. L. Adamson was appointed to succeed him. Dr. Adamson is a graduate of the University of Liverpool, and has taught both at Liverpool and at Oxford universities.

Dr. M. C. Hall received his Ph.D. degree on June 2, the title of his thesis being "The Ground Substance of Loose Connective Tissue."

Dr. T. S. Leeson has undertaken joint authorship of the textbook of histology by Professor A. W. Ham of the Department of Medical Biophysics. The fourth edition is now being published.

During the year the following papers were given by members of the Department: Dr. J. E. Anderson, "Iroquois Physical Types," at the Iroquois Symposium, Eastern States Archeological Federation, Toronto; "Bones and the Archeologist," banquet address, Eastern States Archeological Federation, Toronto; "Current Research in Physical Anthropology," at Queen's University, Kingston; "Fossil Man in the Pleistocene," Society of Friends of the Pleistocene, Toronto; "Physical Anthropology of the Iroquois," at the Northeast Anthropological Conference, Buffalo, N.Y.; "Age Determination by Microscopic Changes in the Dentition," at the American Association of Physical Anthropologists, Columbus, Ohio. Dr. Sylvia H. Bensley, "Microscopic Studies of Living Connective Tissue," at the Second Conference on Research in Arthritis and Rheumatism, Sunnybrook Hospital, Toronto. Mrs. N. S. Cameron, "The Appearance of the Female Symphysis Pubis," at the Canadian Federation of Biological Societies, Guelph. Dr. T. S. Leeson, "Renal Function before Birth," at St. Thomas' Hospital Medical School, London, England, post-graduate medical group, by invitation; "The Fine Structure of the Developing Trachea," at the Electron Microscope Society of America, Annual Meeting at Milwaukee, U.S.A.; "The Effects of Chelation on Rat Liver," at the Burton Society of Electron Microscopy, Guelph; "The Fine Structure of the Trabecular Meshwork," at the Ophthalmology Research Group, Toronto; "The Fine Structure of Rat Liver Following *In Vivo* Decalcification," at the American Association of Anatomists, Chicago; "Electron Microscope Studies of the Trabecular Meshwork of the Human Eye," at the Canadian Federation of Biological Sciences, Guelph, by invitation. Dr. M. C. Hall, "A Method of Forming Standard Gelatinous Bullae in the Subcutaneous Tissue of the Rat, and the Use of these Bullae in Comparing Physical and Histological Characters of Connective Tissue," at the Canadian Conference on Rheumatism in the Rheumatic Diseases, Toronto; "Examination of the Physical Character of Ground Substances by Saline Injection Studies," at the Canadian Federation of Biological Societies, Guelph.

Research

During the summer of 1960 Dr. J. E. Anderson excavated an Indian cemetery near Southampton, Ontario, 2500 years old. Preliminary analysis of the material showed that the inhabitants of the site were tall, robust individuals, morphologically different from the Indians of more recent times.

The Physical Anthropology Laboratory received much more human material during the year, including important collections from the Royal Ontario Museum and the National Museum of Canada. This material was used by Dr. Anderson for a number of anatomical investigations: (*a*) in conjunction with Mrs. N. S. Cameron the age changes in the symphysis pubis were investigated, and erosions found adjacent to the symphysis in the female appeared to be the result of pregnancy and parturition; (*b*) in conjunction with Dr. J. C. C. Alexander a study was made of the volume of the bony orbit in a series of crania to determine individual variations, sex variations, and race variations.

In conjunction with Dr. Joseph Hill of the Department of Ophthalmology, Dr. Anderson developed a method for the reconstruction of fractured orbits, which was used successfully in three patients.

With the aid of a grant of the Banting Research Foundation, Dr. Sylvia H. Bensley continued her microscopic studies of the living iris of albino animals. An attempt was made to correlate the changes in the connective tissue with the changes in the circulating blood of the iris following local acute and chronic systemic reactions.

From her observations she concluded that an increase in intercellular fluid may be due either to an increase in ground substance, an increase in the bound water in the ground substance, or to an excess of fluid above the water-binding capacity of ground substance, and that mast cells play an active role in the break-down and turnover in the ground substance following oedema.

In collaboration with Dr. Lindsay and Dr. Sorokolit of the Hospital for Sick Children, histological studies of flexor tendons and tendon grafts in chickens, after various experimental procedures, were undertaken.

Dr. T. S. Leeson has undertaken the following electron microscopic studies: (1) The fine structure of the developing hamster kidney; (2) the fine structure of the developing rabbit trachea; (3) the effect of chelation on the rat liver in conjunction with Dr. H. Kalant; (4) the fine structure of the trabecular meshwork of the human eye in conjunction with Dr. J. Speakman; (5) the development of mucosal cell types in the stomach; and (6) the fine structure of the tunica serosa of the testis in conjunction with Dr. L. Adamson.

With the aid of grants from the Canadian Arthritis and Rheumatism Society and the J. P. Bickell Foundation, Dr. M. C. Hall has carried out investigations directed at the function and malfunction of joint surfaces.

Joint degenerations were produced experimentally and examined by routine histological and micro-radiographic techniques with the intention of determining the change in character of the intercellular substances of the articular cartilage and its water-binding ability.

In addition the following related investigations have been carried out: (1) the radiological demonstration of the lateral femoral condyle in relation to subluxation of the patella; (2) the altered mechanics of the talo-navicular joint after fusion of the sub-talar and calcaneo-cuboid joints; (3) the sub-talar movement in a calcaneus foot; (4) the trabeculae of the neck of the femur in osteoporosis; and (5) the change in bone growth patterns after hypophysectomy.

Publications

Anderson, J. E. Review, *Canadian Dental Association Journal*, vol. 26, no. 5, 1960, p. 279.
Bensley, Sylvia H. "Microscopic Studies of the Living Iris" (*Anatomical Record*, vol. 138, no. 1, 1960, pp. 39–48).
Hall, M. C. "Comparative Examinations of the Physical Character of Ground Substance by

Means of Gelatinous Bullae" (*Canadian Journal of Biochemistry and Physiology,* vol. 39, no. 5, 1961, pp. 915–24).

——— "Examination of the Physical Character of Ground Substance by Saline Injection Studies" (*Proceedings of the Canadian Federation of Biological Societies*, vol. 4, 1961, p. 29).

LEESON, T. S. "An Electron Microscope Study of the Postnatal Development of the Hamster Kidney" (*Laboratory Investigation*, vol. 10, no. 3, pt. 1, May–June, 1961, pp. 466–80).

ART AS APPLIED TO MEDICINE

Under the direction of M. T. Wishart

The nature of the work in the past year has been largely routine, with nothing offered of a challenging nature. It ranged from fine miniature drawings to bold diagrams, to charts and graphs, television and motion picture stills; from scientific drawings to designs, layouts, and exhibits.

No students were admitted to the first year of the three year diploma course. Although registration is small the course should be supported and every effort made to solve the problem of the lack of qualified applicants. Well-trained medical illustrators are required in Canada. There is no need for a large number but there is need for a continuing number, not only to meet the increasing demand but also to supply expanding departments and for replacement.

Miss Wishart, assisted by Mr. Alex Wright, a third-year student in Art as Applied to Medicine, continued her experiments in the applicability of rezin and epoxy plastics, silicone, and silastic rubbers in the making of three-dimensional models.

Miss Blackstock engaged in the development of the application of transparent and adhesive colour overlays.

In October Miss Blackstock and Miss Wishart attended the Annual Meeting of the Association of Medical Illustrators, held at the University of Illinois. Two interesting features were a European exhibit of medical art, affording a unique opportunity to compare techniques and styles in illustration of various countries, and a workshop demonstration on the construction, design, and rendering of a scientific exhibit.

PUBLICATIONS

WISHART, M. T. Review, *Canadian Medical Association Journal*, vol. 84, no. 11, March, 1961, p. 624.

BACTERIOLOGY

Under the direction of Professor Philip Greey

The undergraduate teaching has continued with minor modifications during the past year. Postgraduate instruction was given to the residents in Otolaryngology and Ophthalmology.

RESEARCH

Dr. R. M. Price has continued her interest in the prophylactic vaccination against tuberculosis, and the study of atypical strains of acid fast bacilli isolated from human sources.

Dr. G. H. Hawks, at St. Michael's Hospital, has completed an extensive investigation of enteritis due to salmonella but unfortunately was not able to establish definitely either the source or the mode of transmission.

Dr. Marion Ross, at Sunnybrook Hospital, has completed a study on the value of hibitane for the preoperative preparation of the skin and is conducting further investigations on its value in other preoperative and postoperative procedures. She also is reassessing the usefulness of various tests devised to indicate the potential pathogenicity of strains of staphylococci.

Dr. T. E. Roy, at the Hospital for Sick Children, has carried out studies on the transduction of antibiotic resistance with staphylococci. He has shown that bacteriophages derived from tetracycline-resistant staphylococci can transfer the resistance to sensitive strains.

Miss Joan Hennessy has continued attempts to isolate the agent of cat-scratch disease in a variety of tissue culture cell lines. Extensive single and multiple inoculation passages have been done in transformed rabbit lymph node fibroblasts and in the FL strains of human amnion. The rabbit lymph node cells transformed spontaneously, after thirteen months of weekly transfers, to a more rapidly growing, epithelial-like cell line. These transformed cells are very sensitive to the cytopathogenic action of Coxsackie B5 and A9 viruses, unlike the original fibroblast line, which six months previously showed no effect when inoculated with Coxsackie B5 or poliovirus. Attempts to isolate the agent of cat-scratch disease have also been initiated in monkey and human heart cell lines, human monocytic leukemia, and human pleural fluid cells. Antigen for the skin test diagnosis of cat-scratch disease has been prepared and sent, on request, to doctors across Canada, to some parts of the U.S.A., and on one occasion to Puerto Rico. Laboratory investigations of dimethoxyphenyl penicillin (Celbenin or Staphcillin) have shown it to be uniformly effective against a wide variety of Staphylococcus aureus strains, regardless of the amount of staphylococcal penicillinase produced. Blood concentrations were determined in a few patients and found to be satisfactory. Strains of Staphylococcus aureus can be made resistant to Celbenin *in vitro* in twelve to fifteen transfers through increasing sub-lethal concentrations of the antibiotic. These resistant strains failed to show any change in the amount of penicillinase produced, and failed to show any destructive effect against the drug itself. In collaboration with Dr. J. M. Finlay, Department of Medicine, bacteriological studies have been continued on patients attending the gastroenterological unit.

Dr. A. E. Franklin has continued studies on the effects of hormones on virus propagation in tissue culture systems. Prednisolone and insulin have been added to growth and maintenance media of a number of serially propagated tissue culture cell lines including cells derived from human epidermoid carcinoma of the cervix, human epidermoid carcinoma of the skin, human pleural fluid (malignant), human monocytic leukemia, normal human adult heart and normal monkey heart. Viruses which are being studied in these cell lines include poliovirus, type 1; Coxsackie virus, Group B, type 5; Coxsackie virus, group A, type 9; ECHO virus, type 9; infectious hepatitis and serum hepatitis. Preliminary observations on the adaptation of Coxsackie A9 and ECHO 9 viruses to HeLa cells have been confirmed. It has also been established that these two viruses can be detected on first passage when inoculated to HeLa cells which have been propagated in the presence of prednisolone for long periods of time. Titrations of poliovirus, type 1, have been continued in HeLa cells with prednisolone, and the titers obtained show that the decreased values obtained earlier are now rising, indicating a further change in the host cell-virus relationship in the continued presence of prednisolone. Hep-2 cells have been studied in a similar manner, and present observations are that this line is more sensitive than HeLa cells to adaptation of Coxsackie A9 and ECHO 9 viruses. Specimens of acute stage infectious hepatitis and serum hepatitis have been blindly passaged under a number of different conditions in HeLa and Hep-2 cells. Although degenerative effects have been obtained in a number of experiments, there has been no consistent or reproducible pattern. Present studies include continued studies with these two cell lines, and similar experiments have been initiated in the human monocytic leukemia cells, human and monkey heart cell lines.

Dr. J. C. Sinclair and Dr. Marjorie Swanson have studied outbreaks of hepatitis at Timmins and Jarvis. Records of approximately 1100 cases of infectious hepatitis in various Ontario centres have been tabulated this past year. Dr. J. C. Sinclair and Miss B. K. Buchner, M.A., assisted by Miss Mona Snyder have made use of the fluorescent antibody technique in a series of well-controlled experiments but have been unable to demonstrate significant changes in the chick embryo after inoculation with infectious hepatitis specimens.

Publications

Franklin, A. E. "The Effect of Hormones on Hela Cells Inoculated with Infectious Hepatitis Specimens" (*Canadian Journal of Microbiology*, vol. 6, no. 5, Oct. 1960, pp. 529–33).
Greey, P. H. "Staphylococcal Resistance" (*Recent Advances*, vol. 1, no. 1, 1960).
——— Review, *Canadian Medical Association Journal*, vol. 84, no. 23, June, 1961, p. 1347.
Hennessy, Joan N. and Spalding, W. B. "Cat Scratch Disease: A Study of Eighty-Three Cases" (*American Journal of Medicine*, vol. 28, no. 4, 1960, pp. 504–9).
Roy, T. E. *et al.* "Some Serological Properties of Substances Extracted from Staphylococci and a Haemolytic Streptococcus" (*Canadian Journal of Microbiology*, vol. 6, no. 6, Dec., 1960, pp. 661–72).

BIOCHEMISTRY

Under the direction of Professor C. S. Hanes

During the past year 379 students received instruction in the department. The decrease of 85 as compared with the previous year is due to the fact that only one class of dental students was provided for, the transfer of the lecture and laboratory courses in biochemistry from the second to the first dental year having been completed. The distribution of the students was as follows:

Faculty of Medicine, first medical year		147
Faculty of Dentistry, first year		112
Factulty of Arts, third year, honour courses		36
fourth year, honour courses		11
Faculty of Household Science		11
Graduates Enrolled as Special Students in Faculty of Arts and Science		9
School of Graduate Study		53
(*a*) Major Subject Biochemistry	15	
Candidates for Ph.D.	10	
Candidates for M.A.	5	
(*b*) From other departments	36	
(*c*) Special Students	2	
Total		379

After retiring in 1960 as Head of the Department, Dr. A. M. Wynne kindly consented to continue to serve as an active member of the staff. During the past year, he has shared with Professor J. Manery Fisher the responsibility for the lecture course in biochemistry in the first medical year. This has permitted the trial during an experimental year of the proposal for dividing the responsibility for the lecture course and the laboratory course for medical students between two staff members. Changes affecting the character of other lecture courses in biochemistry have been planned and, in part, implemented during the year. For example, the fourth year lecture course offered to the Honours courses of Group D (Arts and Science), now given by Professor G. H. Dixon and Professor C. S. Hanes, has been revised to provide broader supplementation of the corresponding third year course, which is the responsibility of Professor B. F. Crocker. Plans have been laid to provide a new course of advanced lectures for graduate students, covering a selection of special topics; these will be given by different staff members and the selection will change from year to year.

As in recent years the Department has collaborated in giving a course in June on clinical applications of radioactive isotopes, under the aegis of the Division of Postgraduate Medical Education. Dr. M. A. Packham has been responsible for organizing the Department's contribution to this course. She has also given some of the lectures and has supervised the laboratory course. Professor G. C. Butler was again able to be present to contribute lectures on "Radiation Dose Calculations."

Professor Dorothy Crowfoot Hodgkin, F.R.S., Wolfson Research Professor (at Oxford University) visited the Department under the auspices of the School of Graduate Studies. She delivered a lecture to a large audience on "X-Ray Crystallography in Relation to Biochemical Problems."

Another distinguished Visiting Lecturer appointed by the School of Graduate Studies was Professor Felix Haurowitz who came to speak on "The Nature and Formation of Antibodies" under the joint auspices of the Departments of Biochemistry and of Medical Biophysics.

An extremely interesting account of symptoms and diseases arising from protein deficiency in African diets was given in an informal seminar by Professor J. C. Edozien, Head of the Department of Chemical Pathology, University College, Ibadan, Nigeria. A mutually valuable exchange of information during Professor Edozien's visit is expected to lead to some collaboration in the future.

Research

Members of the Department have received generous grants in aid of research from the National Research Council of Canada, the newly-formed Medical Research Council of Canada, the National Cancer Institute of Canada, and the University's Advisory Committee on Scientific Research. These grants have permitted a progressive strengthening of the research facilities of the Department.

In Professor G. E. Connell's laboratory, Dr. R. K. Murray has continued his study of the haemoglobin-binding protein, haptoglobin, and its role in haemoglobin metabolism. Using haemoglobin labelled with radioactive isotopes, he compared the behaviour in rabbits of free and bound haemoglobin. Mr. R. W. Shaw concluded his studies on the purification of haptoglobin from human serum. Mr. L. P. Kalutich has commenced work on the purification of the pseudocholinesterase of human serum.

Professors Connell and Dixon have continued to collaborate with Professor Oliver Smithies (now at the University of Wisconsin) in an investigation of the chemical structure of the human haptoglobins of different genetic types. The investigation has been focussed mainly on obtaining homologous peptides from the different haptoglobins and comparing their properties by electrophoretic and chromatographic methods. In the course of this work two new genetic variants of haptoglobin were discovered. The sulphur chemistry of haptoglobin also has been studied and methods have been developed for observing the cleavage of disulphide bonds in proteins.

In Professor Crocker's laboratory, Dr. Albert Hercz has continued his study of the mechanism of the induced biosynthesis of β-galactosidase in E. coli. He has concentrated upon the identification of the nature of the immediate inducer (as distinct from the inducer present in the external medium). Dr. Hercz has now obtained clear-cut experimental evidence that, contrary to the accepted view, the two are not the same. He is now proceeding to identify the nature of the immediate inducer of the formation of this enzyme.

Professor G. H. Dixon, in addition to collaborating with Professor Connell and Professor Smithies in the investigation of human haptoglobins which was mentioned above, has continued his work on the chemistry of insulin. The regeneration of the native, biologically-active molecule of insulin from its isolated polypeptide chains was described by Dixon and Wardlaw in 1960 and further experiments upon the mechanism of this reaction are in progress. A study of the chemical structure of cod-fish insulin has been undertaken in collaboration with Dr. S. Wilson of the Connaught

Laboratories. It is found that there are marked differences in the amino acid composition of the fish insulin as compared with mammalian insulins, suggesting evolutionary differences in the protein structure.

Dr. H. Schachter, working in Professor Dixon's laboratory, has taken up the study of the cleavage of the disulphide bonds of protein in the sulphite reaction. Detailed studies have been made, in particular, on the cleavage products arising from purified proteolytic enzymes in this reaction. Dr. Schachter has studied also the abnormal meconium obtained from children suffering from the meconium ileus condition associated with mucoviscidosis and has observed a series of abnormal proteins in this material. Further work is in progress to characterize these proteins and determine how they arise in the diseased condition.

Professor J. Manery Fisher and Mrs. E. Dryden have continued the study of the relationship between electrolytes of frog muscle and the relative rates of utilization of glucose and lactic acid. Seasonal changes have been established in the concentration of plasma glucose and in the activity of liver alkaline phosphatase.

In Professor Fisher's laboratory, Mr. G. J. Marcus concluded his studies on mitochondria from pigeon breast muscle. He demonstrated with different substrates (α-ketoglutarate, malate, β-hydroxybutyrate), that a soluble factor from muscle stimulates the rate of respiration without influencing the rate of phosphorylation by suspensions of these mitochondria. He showed also that the mitochondria have the capacity to accumulate both potassium and sodium ions but that, under appropriate conditions, they may show some selectivity for potassium. Mr. Y. K. Ma'tuk, in continuing studies on the lens of the eye, has found that lipid solvents extract salts with a higher ratio of sodium/potassium than that characterizing the original lens. The data suggest that sodium rather than potassium is associated with lipids in the lens. Mr. Ian W. French has investigated the influence of aldosterone upon the concentrations of sodium and potassium in muscle tissues of the rat. The results of administration of aldosterone after adrenalectomy suggest that the hormone may exercise some direct control over electrolyte levels in the tissues, in addition to its recognized influence of salt excretion through the kidney.

A group of six workers, graduate students and others, have been engaged with Professor C. S. Hanes in studies on a range of problems, mainly on enzymes. Dr. M. A. Moscarello has continued his investigations on the biochemistry of the Ehrlich ascites tumour cells of mouse, focussing his attention mainly upon various constituents of cell nuclei, isolated by a method developed to obtain preparations virtually free from cytoplasmic contamination. Mr. T. E. Webb concluded his study of the leucylglycine-splitting enzyme of swine kidney. He demonstrated that the enzyme as isolated in different ways is a protein which is conjugated with a substance which appears to be a nucleotidyl-peptide. Dissociation of the complex results in a form of the enzyme which, although still active, is much altered in physical properties. Dr. Sampath Kumar, a post-doctoral Fellow of the National Research Council, has studied a related conjugated enzyme from the same source, in this case, a polypeptidase capable of hydrolysing polypeptide chains from the amino end of the chain. Mrs. Solveig Bjerre and Professor Hanes have studied various mild means for the separation of the members of such complexes by exposing them to gel chromatography under appropriate conditions of ionic strength. An important achievement by Mr. J. T. Wong has been the development of a new mathematical formulation of kinetic equations for two-substrate enzyme systems without the special assumptions regarding kinetic properties which have been necessary in the past. Mr. Wong is studying liver alcohol dehydrogenase in order to obtain additional data needed to test the applicability of the new formulations for elucidating the mechanism of this already much-investigated enzyme. Mr. Ross Donovan has commenced a study of the enzymic break-down of elastin by the pancreatic elastase.

The publication of a series of six papers describing quantitative chromatographic procedures for the analysis of amino acids deserves comment as the culmination of an onerous collaborative effort to which many of Professor Hanes' colleagues have

contributed, on a part-time basis, over a period of some eight years. It was felt that detailed publication of these methods might be helpful to workers in many fields of research. Adequate description was made possible by a most generous allowance of space by the editors of the *Canadian Journal of Biochemistry and Physiology* and it is gratifying to report that a widespread interest appears to justify the considerable efforts of all concerned; at the time of writing (about four months after publication) more than 1000 requests for sets of reprints have been received from numerous countries in all continents.

Graduate students in the Department of Biochemistry have completed work for post-graduate degrees and presented theses as follows:

For the M.A. degree:

Ma'tuk, Yousef K. Lens metabolism and ion movement.
Mayoh, Miss Helen. Carbohydrate metabolism in the frog.
McMurray, Mrs. Astra (Hasner). The effect of insulin on the electrolytes and rate of oxygen consumption of frog muscle; the influence of nitrate, chloride and calcium.

For the Ph.D. degree:

Marcus, George J. Electrolytes and metabolism in pigeon muscle mitochondria.
Webb, Tom E. A study of certain conjugated peptidases.

Publications

Connell, G. E. and Shaw, R. W. "The Purification of Haptoglobin" (*Canadian Journal of Biochemistry and Physiology*, vol. 39, no. 6, 1961, pp. 1013–19).

Dixon, G. H. and Wardlaw, A. C. "Regeneration of Insulin Activity from the Separated and Inactive A and B Chains" (*Nature*, vol. 188, 1960, pp. 721–4).

Hanes, C. S. "Quantitative Chromatographic Methods, Part 2: An Approach to Paper Chromatography of Improved Resolving Power and Reproducibility" (*Canadian Journal of Biochemistry and Physiology*, vol. 39, no. 1, Jan., 1961, pp. 119–40).

Hanes, C. S., Harris, C. K., Moscarello, M. A. and Tigane, E. "Quantitative Chromatographic Methods, Part 4: Stabilized Chromatographic Systems of High Resolving Power for Amino Acids" (*Canadian Journal of Biochemistry and Physiology*, vol. 39, no. 1, Jan., 1961, pp. 163–94).

Harris, C. K., Tigane, E. and Hanes, C. S. "Quantitative Chromatographic Methods, Part 7: Isolation of Amino Acids from Serum and other Fluids" (*Canadian Journal of Biochemistry and Physiology*, vol. 39, no. 2, Feb., 1961, pp. 439–51).

Holmes, R., Sheinin, Rose and Crocker, B. F. "A Study of the Permeability Barrier to β-Galactosides in Escherichia coli B" (*Canadian Journal of Biochemistry and Physiology*, vol. 39, no. 1, Jan., 1961, pp. 45–54).

Manery, J. F., O'Neill, K. E., Meakin, J. W., Dryden, E. E., and Duffield, J. C. "The Effect of Bound Insulin on the Respiratory Rate and Electrolytes of Intact Frog Muscle" (*Canadian Journal of Biochemistry and Physiology*, vol. 38, no. 11, Nov., 1960, pp. 1281–94).

Marcus, G. J. and Manery, J. F. "Oxidative Phosphorylation and Cation Accumulation in Muscle Mitochondria" (*Proceedings of the Canadian Federation of Biological Societies*, vol. 4, 1961, p. 43).

Matheson, A. T., Tigane, E. and Hanes, C. S. "Quantitative Chromatographic Methods, Part 5: An Improved Ninhydrin-hydrindantin Reagent" (*Canadian Journal of Biochemistry and Physiology*, vol. 39, no. 2, Feb., 1961, pp. 417–25).

Murray, R. K., Connell, G. E. and Pert, J. H. "The Role of Haptoglobin in the Clearance and Distribution of Extracorpuscular Hemoglobin" (*Blood*, vol. 17, no. 1, Jan., 1961, pp. 45–53).

Neelin, J. M. and Butler, G. C. "A Comparison of Histones from Chicken Tissues by Zone Electrophoresis in Starch Gel" (*Canadian Journal of Biochemistry and Physiology*, vol. 39, no. 3, March, 1961, pp. 485–91).

Sheinin, Rose and Crocker, B. F. "The α-Galactosidase Activity of Escherichia coli B" (*Canadian Journal of Biochemistry and Physiology*, vol. 39, no. 1, Jan., 1961, pp. 55–61).

——— "The Induced Concurrent Formation of α-Galactosidase and β-Galactosidase in Escherichia coli B" (*ibid.*, pp. 63–72).

Tigane, E., Wade, E. H. M., Wong, J. Tze-Fei, and Hanes, C. S. "Quantitative Chromatographic Methods, Part 6: Improved Procedure for Determination of Amino Compounds on

Paper Chromatograms" (*Canadian Journal of Biochemistry and Physiology*, vol. 39, no. 2, Feb., 1961, pp. 427–37).

WADE, E. H. M., MATHESON, A. T. and HANES, C. S. "Quantitative Chromatographic Methods, Part 3: Factors Controlling the Patterns of Separation of the Amino Acids on Paper Chromatograms" (*Canadian Journal of Biochemistry and Physiology*, vol. 39, no. 1, Jan., 1961, pp. 141–61).

COMMITTEE ON EXPERIMENTAL RESEARCH

Chairman: Professor J. D. Hamilton
Supervisor: Dr. R. C. Ritchie

During the past year there was a 30 per cent increase in the total number of dogs used, and a corresponding increase in the number of small animals. Space for the accommodation of animals is now becoming a difficult problem. At present the possibility is being explored of enclosing a central open courtyard in the west wing of the fifth floor.

Various improvements have been made in the facilities including the purchase of new cages for dogs and rabbits, and the construction of a room on the sixth floor to house cats. Consideration is also being given to use a room on the sixth floor for isolation of ill animals, as we continue to be bothered by various illnesses particularly in the dogs.

I should like to express my appreciation to Dr. Ritchie, Dr. Baer, and the staff for their loyal support and hard work in improving the facilities for experimental research in the Banting Institute, and in maintaining a high quality of service to all those engaged in experimental research.

MEDICAL BIOPHYSICS

Under the direction of Professor A. W. Ham

Professor Johns spent the year on sabbatical leave with Professor Delbruck at the California Institute of Technology, where he was engaged in microbiological research.

Although the Department of Medical Biophysics as such provides courses of instruction only at the graduate level, many members of the staff, because of cross-appointments in other departments, or by invitation, do give instruction to undergraduate medical and other students in courses under the supervision of other Departments, as will be described briefly later. Furthermore, by means of the written word, members of the Department participate in medical teaching fairly extensively. For example, two textbooks were published from the Department last year: the second and greatly enlarged edition of *The Physics of Radiology* by Professor Johns, and the fourth edition of *Histology* by Professor Ham. The latter for the first time was prepared with a co-author, Professor T. S. Leeson of the Department of Anatomy. In addition, at the request of the Editor of the *University of Toronto Medical Journal* the four main articles of the April 1961 issue of the journal, which was devoted to the subject of modern radiobiology, were prepared by four members of our staff engaged on research in this subject; namely, Professor Bruce, Professor Hunt, Professor Till, and Professor Whitmore, so that medical students could have ready access to some of the newer work and concepts in this field.

Teaching because of Cross-appointments or by Invitation

Undergraduate: Professor Axelrad and Professor Bruce each gave a lecture on carcinogenesis and radiobiology respectively to second year students in the course in

Pathology; Professor Bruce gave 25 lectures in the premedical course in Physics; Professor McCulloch was again responsible for the course in Clinical Microscopy given to second year medical students under the Department of Medicine; Professor Siminovitch gave four lectures in the course in Systematic Virology, which is part of the Diploma Course in Bacteriology in the School of Hygiene; and Professor Till gave the course in Physics 18 (Atomic Spectra, X-rays, and Radioactivity) given to Physiology and Biochemistry students.

Graduate: Only one of our graduate full courses was given last year, "The Physics and Chemistry of Virus Action." This course, which was in charge of Professor Siminovitch and Professor Fuerst, was given to graduate students working in the Department towards their M.A. or Ph.D. degrees. Professor Axelrad gave six lectures in Immunogenetics as part of the cytogenetics seminar course in the School of Graduate Studies.

Post-graduate: Professor Axelrad gave a lecture on "Genetics" in the post-graduate course in Obstetrics and Gynaecology, and one on the same topic in the postgraduate course in Medicine. Professor Ham gave a lecture on "Some of the Newer Work Relating Virus to Cancer" to the refresher course on General Practice, and to the refresher course on General Surgery. Professor McCulloch gave 10 demonstrations in Haematology, a lecture on "Viruses and Neoplasia," and a lecture on "Purpura and the Haemorrhagic Disorders" to the advanced postgraduate course in Medicine.

Outside Lectures Delivered

Members of the staff delivered lectures and/or papers as follows:

Professor Axelrad on "Current Concepts in Carcinogenesis" at the New Mount Sinai Hospital, Toronto; on "Dynamics of Viral Carcinogenesis in the Hamster" at the Henry Ford Hospital International Symposium on Host Tumor Interactions at Detroit; on "Effects of Age on Thymus Cell Number, Histology, and Susceptibility to Induction of Lymphoma by Gross A Virus in C3H$_f$/Bi Mice" at the annual meeting of the American Association for Cancer Research at Atlantic City; and on "Recent Studies on Virus Leukemia in Mice" at the annual meeting of the Royal Society of of Canada at Montreal. Professor Bruce on "A Comparison of Calculated and Measured Scattered Spectra from X- and Gamma-ray Beams with HVL's from 1.25 mm. Cu to 6 mm. Pb" at the annual meeting of the Radiation Research Society in Washington. Professor Cinader on "Immunochemical Studies with Ribonuclease" to the New York Academy of Sciences, and on "An Immunochemical System of Three Components, Enzyme, Antibody and Substrate" at the Roswell Park Memorial Institute, at Buffalo. Professor Ham on "Viral Carcinogenesis in the Hamster Kidney" at the annual conference at the Detroit Institute for Cancer Research; on "The Cell, from Light to Electron Microscopy" to the annual meeting of the Ontario Association of Pathologists; two lectures—"The Polyoma Story" and "Possibilities Regarding a Virus Causation of Tumors in Man" to the 9th annual meeting of the Arizona Division of the American Cancer Society; and on "Viral Carcinogenesis in the Hamster Kidney" at the Ciba Conference on Murine Tumour Viruses held at Perugia, Italy. Professor Helleiner, with Mr. M. Gold, on "The Effect of Radiation on the Level of DNA-synthesizing Enzymes in Strain L Mouse Fibroblasts" at the 4th annual meeting of the Canadian Federation of Biological Societies at Guelph, Ontario. Professor Howatson on "Studies of Polyoma Virus in Hamster Kidney" at the European Regional Conference in Electron Microscopy, Delft, Holland; on "Fine Structure of the Virus of the Human Wart (Verruca Vulgaris)" at the 5th annual meeting of the Biophysical Society, Saint Louis, Mo.; on "The Structure and Development of Viruses with Special Reference to Tumor Viruses" at the Montreal Cancer Institute, Montreal; and on "The Structure and Development of Some Animal Viruses" at the Burton Society of Electron Microscopists, Kingston, Ontario.

Professor Hunt with Professor Till and Mr. M. A. Lynch on "Free Radicals and Radiation Damage in Irradiated Ribonuclease" to the Radiation Research Society Meeting, Washington, D.C. Professor Johns on "Newer Radiotherapeutic Sources of Radiation and the Distributions that They Produce in Biological Materials" at the Conference on Research on the Radiotherapy of Cancer, University of Wisconsin, Madison, Wis.; on "The Measurement of Build-up on a Curved Surface Exposed to Beams of Cobalt 60 and Caesium 137," at the American Radium Society, Colorado Springs, Colorado; he also attended the International Commission on Radiological Units, at Geneva. Professor McCulloch on "Viral Carcinogenesis *in vivo*" at the American College of Physicians, Miami; on "Measurement of the Number of Viable Cells in a Suspension of Mouse Bone Marrow" at the Radiation Protection and Marrow Transplantation Meeting at Atlantic City; and on "Measurement of the Proliferative Capacity of Mouse Hematopoietic Tissue, Applied to Irradiation of Marrow *in vivo*," at the American Association for Cancer Research Meeting, Atlantic City. Professor Till on "Radiation Effects on the Division Cycle of Mammalian Cells *in vitro*" to the New York Academy of Sciences; on "The Division Cycle of Mammalian Cells in Culture" at the Biological Laboratory, Cold Spring Harbor, New York; and on "The Radiation Sensitivity of Mouse Bone Marrow Cells Irradiated *in vivo* and *in vitro*" to the Radiation Research Society, Washington, D.C. Professor Siminovitch on "The Induction of Tumors in Hamsters with Polyoma Virus" to the Biology Division, Oak Ridge National Laboratory, Oak Ridge, Tennessee, to the University of Vermont Medical School, Burlington, Vt. (Sigma XI Lectureship), to the University of Dartmouth Medical School, Hanover, N.H. (Biophysics Society Lectureship), to the Biochemistry Department at Duke University Medical School, Durham, N.C., to the Biochemistry Department, McGill University, Montreal; on "Viruses and Cancer" to the Canadian Cancer Society, Peterborough, Ontario; on "Studies on the Multiplication of Viruses in, and Effects of Irradiation on, Earle's L Strain Cells" to the University of Texas M.D. Anderson Hospital and Tumor Institute, Houston, Texas, to the University of Vermont Medical School, Burlington, Vt. (Biophysics Society Lectureship), to the Roswell Park Memorial Institute, Buffalo, N.Y., and to the Biochemistry Department at Duke University Medical School, Durham, N.C.

Research

The staff of the Department is constituted of representatives of many biological disciplines as well as radiobiologists and radiation physicists. Most members carry on fundamental research in their particular discipline and in addition collaborate extensively with those of other disciplines in order to bring their combined knowledge to bear on researches designed to further information in the general field of cell biology and, in particular, on the phenomenon of neoplasia. The major research programmes under way will now be described briefly.

Studies on relation of virus to neoplasia with the polyoma virus. As was reported last year, a group of us (Professor Axelrad, Professor Ham, Professor Howatson, Professor McCulloch, and Professor Siminovitch) have shown that a polyoma virus recovered from mouse tissue has the property, when it is injected into new-born hamsters, of quickly and simultaneously instituting two different types of pathological process in the developing stromal cells of the kidney. The first is necrosis similar to that produced in cells with non-tumour viruses. This lesion persists for only a few days and we have shown it to be associated with the multiplication of the virus in the cells that are subsequently destroyed by the virus. The second effect of the virus, however, is to institute malignant transformations in the same type of cell; this results in huge diffuse kidney tumours and many of the animals die in ten days. In instituting this second type of effect—neoplasia—the virus disappears as an infectious entity. Thus, a tumour induced by a virus continues to grow although the virus that caused it can no longer be detected.

We have tried to find the factors concerned in the virus instituting the second of the above two effects; namely, neoplasia. The age of the animal that is given virus is a factor, for animals injected at 20 days only occasionally develop kidney tumours. Our experiments indicate that the reason that the new-born animals readily develop tumours when given virus is that in these animals large numbers of cells are present which are susceptible to neoplastic transformation because of their embryonal nature. The new-born rat is also susceptible to tumour induction with polyoma virus but in contrast to the hamster, in the rat necrotizing lesions are not seen. Further, the neoplastic response is not observed until the sixteenth day after injection.

In addition to the *in vivo* studies described above, Mr. C. P. Stanners and Professor Till have investigated the oncogenic effect of polyoma virus on hamster embryo cells in tissue cultures. In this work clones of cells have been isolated from cultures of cells infected with polyoma virus, and the cells from these clones have developed into malignant neoplasms when they have been injected into adult hamsters.

Professor Whitmore and Professor Siminovitch have studied the effect of ultraviolet irradiation on the polyoma virus both *in vivo* and *in vitro*.

Dr. R. Sheinin, in Professor Siminovitch's laboratory, has worked on the measurement of the polyoma virus by the plaque assay technique and she has developed a rapid and reproducible plaque assay method. She has also worked on the purification and concentration of the virus where it has been shown that it is possible to concentrate the virus from culture fluids with protamine sulphate. Extensive purification of the virus has been achieved using chromatographic technics. The growth cycle of polyoma T virus on mouse embryo cells has been determined, and it has been demonstrated using fluorod eoxyuridine (an inhibitor of nucleic acid metabolism) that the formation of viral nuclei acid occurs between 30 and 60 minutes before the release of intact virus from the cells.

Studies on mouse leukemia and the leukemia virus. It is known that new-born mice are normally susceptible to the induction of leukemia by the Gross virus. Professor Axelrad and his associates have shown that adult mice can be made susceptible to the induction of leukemia with this virus by whole-body X-irradiation. His experiments indicate that in both new-borns and irradiated adults cells are present in the thymus gland whose fate is not completely committed. These cells are called upon to multiply and under these conditions are susceptible to leukemic transformation by the virus. It has been known also that if radiated mice, after the radiation, are given intravenous injections of bone marrow from identical non-radiated mice, they do not develop leukemia. Professor Axelrad, by injecting bone marrow cells from female mice (whose chromosomes can be distinguished from those of male mice) into irradiated male mice, has been able to show that the thymus gland, which is largely destroyed by the radiation, is regenerated in the marrow-injected mice from the injected marrow cells. This work suggests that the reason for the injected marrow protecting radiated mice from developing leukemia is that the injected cells provide a source of healthy cells from which the injured thymus gland can be regenerated and this would prevent leukemia by suppressing the multiplication of such thymic cells as are left in the radiated thymus and which, if they were called upon to proliferate, would undergo a neoplastic transformation.

Professor Axelrad is also engaged in other studies with the Gross virus as is Professor McCulloch with the Friend virus. Dr. Hurley has collaborated with both by making studies with the electron microscope, of both viruses in the leukemias they produce.

Search for tumour viruses in man. Under the supervision of Dr. McLeod, a separate isolated laboratory has been established in an attempt to isolate oncogenic viruses from human neoplasms. The methods employed in this laboratory include tissue culture, inoculation of new-born and adult animals, and the cultivation of tumour tissue in conditioned animals. A survey of human material is being made by these methods, hoping to observe virus action either in the form of a cytopathogenic

effect in tissue culture, a malignant transformation in tissue culture, or an arrest of differentiation in cells of the animal.

Studies on the virus of human warts. Using the electron microscope as their principal tool, Professor Howatson in collaboration with Dr. M. G. Williams and Mrs. J. D. Almeida, by negative staining technics, have worked out the detailed morphology of the virus of human warts and have shown that it, like the polyoma virus, is in the form of an icosohedron with 42 capsomeres. It differs from the polyoma virus, however, by being somewhat larger. Dr. Williams, Mrs. Almeida, and Professor Howatson, by means of light and electron microscopy, and by the use of immunofluorescence technics, ascertained the sites of virus production in the cells of warts and by means of these technics have determined the nature of the inclusion bodies that have been described previously.

Fundamental studies in virology. Under the direction of Professor Siminovitch, Mr. R. Kajioka has been engaged in purifying vaccinia virus by column purification, and by means of centrifugation in caesium chloride gradients. Virus labelled with P^{32} and C^{14} has been prepared and the purification followed by means of isotope technics. With Dr. Dales, Professor Siminovitch has followed the stages of adsorption, penetration, and development of vaccinia virus in L cells in the electron microscope. These studies are being continued in collaboration with Mr. Kajioka and Professor Howatson. Mr. J. Friesen, working under the direction of Professor Siminovitch, is studying the sensitivity of free vaccinia virus and the vaccinia virus host cell complex to ultraviolet light and to X-rays. Mr. F. Kahan, under the direction of Professor Siminovitch, has studied the turnover of macromolecules in Earle's L cells, and the kinetics of activation of amino acids on ribonucleic acid using labelled amino acids.

Professor Fuerst, with the assistance of Mr. Ed. Cinits, has continued an investigation of murine encephalomyocarditis virus with the chief emphasis being on the characterization of several plaque-type mutants of the virus. Biological and physicochemical properties of the mutants are being examined and it has been shown that some of the mutants that can be distinguished by plaque type also differ with respect to heat stability and adsorbability to host cells (Earle's L strain cells).

Professor Whitmore, in collaboration with Professor Howatson and Mr. L. Prevec, has been working on the purification and characterization of vesicular stomatitis virus.

Research in radiobiology. Professor W. R. Bruce, with Mr. D. Mount, by means of transparent chambers inserted into rabbit's ears, has been able to study directly, with the microscope, the response of blood vessels in the chambers to radiation. In addition, by using isotope technics, they have been able to measure accurately the exodus of certain substances from the radiated vessels and hence to compare this with what occurs in non-radiated vessels under the same conditions.

In addition, Professor Bruce has continued his investigation of the scatter of X- and gamma-rays and has calculated the average linear energy transfers for a number of radiologically important geometries. In collaboration with Dr. R. G. Baker and Mr. D. Rotenberg, Professor Bruce has continued the design and application studies of the whole body scanner. One problem here has been to find a radioactive isotope that would be taken up sufficiently in sites of tumour growth to indicate their presence on a body scan. At present, radioactive halogen analogs of thymidine, which are incorporated into DNA, and hence into proliferating cells, are being investigated as possible tumour labels.

Professor C. W. Helleiner has continued to work on the enzymes of deoxyribonucleate metabolism in strain L mouse cells grown *in vitro*. With Mr. M. Gold, the level of deoxyribonucleotide polymerase after irradiation of the cells with X-rays has been investigated. The activity of this enzyme shows the same drop as does the rate of deoxyribonucleate synthesis about 16 hours after irradiation, and then rises again. The levels of the two deoxyribonucleases are unchanged. Mr. T. J. Griffith is engaged in a study of the kinases responsible for the synthesis of deoxyribonucleoside triphosphates in L cells.

Professor J. W. Hunt and Mr. W. B. Sampson are utilizing a sensitive electron spin resonance spectrometer to study the transient free radicals produced in water by high energy protons. With Dr. W. E. C. Allt and Dr. W. D. Rider, Professor Hunt has been investigating the dosimetry and treatment of malignant lesions using radioactive Ta^{182} wires. He also is studying the use of chemical dosimeters to measure the dose received by critical organs of a patient during radiation therapy.

Professors E. A. McCulloch and J. E. Till have collaborated extensively during the year to develop a method for measuring the number of cells in a marrow suspension that are capable of proliferating when the cells are injected intravenously into another animal that has been given a lethal dose of total-body radiation. The marrow cells that are capable of continued proliferation on transplantation give rise, in the irradiated animal, to colonies of cells which are readily counted in the spleen. The technic has lent itself among other things to measuring the radiation sensitivity of bone marrow cells, the effects of different methods of freezing in different concentrations of glycerol on the proliferative capacity of marrow cells, and the recovery *in vivo* of bone marrow following a single small dose of X-rays.

Mr. S. Mak and Professor J. E. Till, in collaboration with Professor G. F. Whitmore, are investigating the effects of radiation on the various stages of the division cycle of L-strain mouse cells in tissue culture. The most pronounced effect of radiation on the progress of cells around the division cycle appears to take place in the period immediately prior to cell division. Except at very high dose levels, cells irradiated at any position in the cycle continue to progress through the cycle at close to the normal rate until they reach the stage immediately prior to division, whereupon they are held at this stage for a length of time which is dependent on the dose of radiation used.

Professor J. W. Hunt, in collaboration with Professor J. E. Till, has investigated the properties of ribonuclease following exposure of the enzyme to high doses of radiation. The consequences of the production of active free radicals in the enzyme molecules by the radiation has been studied both by physical and by biochemical techniques in an attempt to assess the importance of free radicals in radiation damage to biological macromolecules.

Dr. Whitmore's principal interest has continued to be the study of the effect of radiation on mammalian cells *in vitro*. These studies, which are being carried out in collaboration with Dr. J. E. Till and Mr. D. O. Schneider, include the post-irradiation effects on DNA and RNA synthesis, the relative biological efficiency of neutrons and conventional X-rays as producers of biological damage, and the effect of post-irradiation treatments on the survival of irradiated mammalian cells.

Research on immunology and immunochemistry. Dr. Cinader has continued his studies on the mechanism of antibody formation in the rabbit; on the mechanism of acquired immunological tolerance; on interaction of enzymes and antibodies and on the immunotherapy of choriocarcinoma. The immune response of normal individuals and individuals with tumour is also being investigated.

Dr. Cinader, Dr. Siminovitch, Dr. McCulloch, and Mrs. S. Dunbar continued studies on antibody synthesis in inbred mice. *B. megatherium* bacteriophage is being used as the antigen and the antibody response of various types of mice is being measured. The homogeneity of the antibody response in inbred mice, the kinetics of antibody synthesis, the genetic control of antibody synthesis, the effect of antigen dose on antibody synthesis and other elements of antibody synthesis are being examined.

The following work is also being carried out in Dr. Cinader's group:

In collaboration with Dr. Chou, work was carried out on the mechanism of antibody formation. Cells from adult normal animals were incubated with molecularly-defined antigens *in vitro* and were then transferred to new-born animals. Such new-born animals are themselves incapable of making an antibody response, so that antibody found in new-born animals shortly after inoculation can be attributed to the influence of the transferred adult cells.

In collaboration with Dr. Fujio, the effect on these systems of various anti-

metabolites, including chemotherapeutic agents, are being investigated. This may allow the direct determination of the effect of established types of chemotherapeutic agents on the antibody response and may ultimately help in the selection of therapeutic agents which have the least deleterious effect on antibody formation.

In collaboration with Dr. Lafferty and Mr. Carter, the immunochemical discrimination of protein antigens differing by as little as one amino acid group, is being investigated and the mechanism of reaction between antibody and enzyme is being studied.

The structure of antigen-antibody complexes, with viruses and soluble proteins as antigens, is being examined in the electron microscope in collaboration with Dr. Howatson.

In collaboration with Mr. J. St. Rose, the duration of tolerance and the elimination of antigen from animals whose tolerance is breaking down is being investigated and with Mr. St. Rose, Dr. Darte, and Dr. Rider the elimination of antigen is also being studied in normal human subjects, in human subjects with tumours and with human subjects with Hodgkin's disease. Work on immunotherapy of choriocarcinoma is being continued both in its application to patients and in the analysis of the immunology of the disease.

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MEDICAL JURISPRUDENCE

Under the direction of Professor K. G. Gray

In addition to lectures by the two appointed lecturers, addresses were given by four visiting lecturers, the Honourable Mr. Justice Schroeder, the Honourable Mr. Justice Gale, the Honourable Mr. Justice Stewart of the Supreme Court of Ontario, and Mr. Allan Leal, Dean of the Osgoode Hall Law School.

The lectures dealt with a number of legal topics arising in medical practice. There were discussions of such subjects as the structure of the courts in Ontario, the medical practitioner as an expert witness, the rules of evidence, the law governing consent for operation, sterilization, abortion, and malpractice.

Fifteen of the students were invited as the guests of the Medico-Legal Society of Toronto to participate in a week-end session which portrayed the trial of an action for negligence.

The senior lecturer and a number of the students were the guests of Mr. Justice Stewart at the University Club for the purpose of discussing the content of the lectures and as a result the students proposed a number of changes in the course which will be adopted next year.

MEDICINE

Under the direction of Professor K. J. R. Wightman

The Department of Medicine is suffering from growing pains of increasing severity. Largely as the result of the efforts of Professor R. F. Farquharson greatly increased support for research work and postgraduate study has become available, as well as a group of keen young men who show great promise and are working energetically and imaginatively at a great variety of problems. However, they are faced with a lamentable shortage of space in both university and hospital premises. In this regard we are most grateful for the opportunities which have been provided at Sunnybrook Hospital, and heartened by the plans for expansion at the Wellesley Hospital, the Toronto Western Hospital, and St. Michael's Hospital, with appropriate attention to the needs for research space. The new Clinical Investigation Unit at the Toronto General Hospital, which is soon to be opened, promises to be extremely useful and is much appreciated. Plans for added space at the Banting Institute give some indication of aid there, but the needs of the immediate future indicate that an even greater development of research facilities will be required. It has been difficult to overcome the traditional view that a hospital is primarily a surgeon's workshop, and to establish the fact that developments in the past thirty years have brought to the physician powers of definitive therapy which now match his long-recognized diagnostic and prognostic skill. The laboratory and the clinical investigation unit are the physician's workshops, and more and more of his patients require study and treatment in hospital as a result of the increasing complexity of medical therapy and investigation.

At the same time it has become increasingly apparent that the optimal condition for teaching this subject involves the provision of a larger number of teachers who can deal with a smaller group of students. It is difficult to maintain a proper perspective as to what constitutes an educational experience on the wards and what is merely a matter of vocational training. Nearly all teachers would agree that the former is the main desideratum yet, almost unconsciously, the tendency is to produce arrangements which in essence are aimed at the latter. The situation is complicated by the requirement for increasing facilities for postgraduate training which to some extent conflict with the undergraduate programme.

All these factors tend to lead to an expansion of staff for which it is difficult to find adequate support. At the same time, our concern regarding the measures which must be taken to preserve our teaching units and out-patient clinics in an altered economic situation is increasing. These are matters which emphasize the need for the closest liaison between hospital and university. There should be no doubt that the teaching hospital serves the community best by making arrangements which favour the development of research and study, but in a situation where beds always seem to be in demand it is difficult to avoid a tendency to deal with the most immediately pressing needs first, and thus to lose sight of long-term objectives. It is very difficult to recognize the concatenation of economic, political, and administrative dispositions which will afford the best opportunity for teachers and students, but it is a matter to which the staff has given much thought.

The important role which the psychiatrist has in the general hospitals is becoming more and more evident. Most hospitals now have psychiatric units, and the influence they may have on teaching and practice in the whole hospital is only beginning to be felt. An attempt is being made to ensure that this development is closely linked with the activities of the Department of Medicine in an atmosphere of mutual support.

We are sorry to lose Dr. O. H. Warwick, who came to us in 1948 after having had a varied and extensive training giving him a special interest in malignant disease. He has a great gift as a teacher and has had a considerable influence on the point of view of staff. We offer him our congratulations and best wishes.

It is with great regret that we record that Miss Stella Clutton who has been secretary of the department since 1922 is retiring this year. She has served the department unstintingly and has always taken a warm interest in the students and graduates who have worked in the department. She will be greatly missed, and her friends in the medical profession across the country will join in wishing her happiness in the years to come.

We are also losing the services of Dr. W. A. Oille, who will devote his time to a study of the curriculum and a study of the function of the medical school for the next year or so. This study commenced auspiciously with a conference of the Heads of the departments at Jackson's Point last spring. Dr. Oille will return to his duties on the medical staff when this work is completed. In the meantime, we will all be interested in the progress which is made in this important venture.

The staff has been strengthened by the addition of Dr. E. D. Wigle who has returned to Toronto after studies in Great Britain and California, and Dr. J. G. Humphrey who has completed his postgraduate training in Neurology.

Dr. J. C. Sinclair was granted leave-of-absence for three months to allow him to serve on one of the first Red Cross teams of doctors in the Congo after the Belgians left the country. Dr. R. L. MacMillan spent two months at the Medical Research Council Special Unit at Oxford, studying haemophilia and blood coagulation. Dr. C. Ezrin was invited to attend a conference on the pituitary regulation of thyroid function which was held at Harriman, New York, under the auspices of Columbia University. Dr. Fraser Mustard was invited to participate in an International Conference on the blood platelet at the Ford Hospital in Detroit, and also in the International Blood Transfusion Congress held in Tokyo in December 1960. Dr. Wallace Graham delivered two papers (by invitation) at the All Soviet Union Conference on Rheumatic Diseases in Moscow in January 1961. In the past year the Canadian Arthritis and Rheumatism Society has made it possible for Dr. Graham to devote his full time to the development of a service for rheumatic diseases, described elsewhere in this report, and to co-ordinate activities in this field in the University. Professor W. Hurst Brown spent a month at the Middlesex Hospital, London, as our delegate in the series of exchanges which has been going on for the past few years.

Numerous members of the department have taken part in medical meetings in various parts of Canada and the United States, and several postgraduate courses have involved the department to a greater or less extent—these are noted in the report of the Division of Post-graduate Medical Education.

During the year we have enjoyed visits from Professor John McMichael and Professor J. Dacie of the British Postgraduate School, Professor W. Anderson of Glasgow, Professor P. A. T. Mollison from St. Mary's Hospital, London, Professor R. Kurilsky, University of Paris, Sir Charles Symonds from Queen Square, London, Dr. Elisha Atkins of Yale University Medical School, Dr. Austin Doyle, Melbourne, Australia, Dr. J. A. Bonnin of Adelaide, Australia, and Dr. Russell Chisholm of Auckland, New Zealand. These men have taken part in both undergraduate and postgraduate teaching and their visits have provided opportunities for a stimulating exchange of ideas with our staff.

In general the morale of the department is high. The support and co-operation which they have offered to the new Head of the Department is much appreciated and gratefully acknowledged.

Research

As noted above, the funds available for research work are increasing. The University has received several benefactions which add greatly to the support which is offered by various granting bodies. The work which is being done has involved collaboration with other departments in the Hospital and in the University, and there has been a healthy tendency for men who are studying similar problems in the various hospitals to co-operate with one another and share their experience.

Rheumatic Diseases

A long-term Active Treatment Unit was opened in September at the Queen Elizabeth Hospital, consisting of thirty beds. This is to provide for the long-term treatment and investigation of arthritis patients who are admitted after having been studied in a teaching hospital. This Unit is supported by the Ontario Division of the Canadian Arthritis and Rheumatism Society and provides an excellent opportunity for studying the efficacy of various therapeutic measures, including new drugs, and affords the possibility for careful follow-up study. Dr. Wallace Graham is the Director of this Unit, where he has been assisted by Dr. John Digby. Research in this field is also facilitated by the existence of an Arthritis and Rheumatism Service at Sunnybrook Hospital. Dr. Graham has continued his study of the therapeutic value and toxicity of non-steroid anti-inflammatory agents. He and Dr. Digby have done some experimental work with silicone plastic to determine whether it could be used in knee joints severely damaged by arthritis.

Dr. M. A. Ogryzlo has continued his studies on gout. An evaluation of a new uricosuric agent (sulfinpyrazone) has been carried out. The study of uric acid metabolism reveals that gouty patients can be divided into two groups on the basis of the amount of uric acid they produce and excrete. The presence of a renal factor in gout seems to have been identified. The effect of prolonged fasting and of various diuretics on uric acid metabolism and excretion has been studied. The diurnal variation in uric acid excretion is being followed. A study of platelet turnover and megakaryocytic activity has begun, in collaboration with Dr. Fraser Mustard and Dr. Hugh Smythe, to see what factors may be responsible for the high incidence of peripheral vascular disease in this group of patients. Dr. Ogryzlo has continued his study of plasma proteins, using various electrophoretic techniques, and has now accumulated experience with 100 patients suffering from multiple myeloma.

Dr. Hugh Smythe is studying the uric acid pool and uric acid turnover, using radioactive isotopes. He has completed a study of ankylosing spondylitis. Dr. Robert Moore, in collaboration with Dr. Anderson, has carried out a study of the natural history of osteoarthritis in the shoulder joint.

Cardiovascular

At the Toronto General Hospital, Dr. C. R. Burton and Dr. G. Aguzzi are studying the vectorcardiogram in congenital heart disease, cardiac infarction, and various types of myocardiopathy. Dr. W. F. Greenwood and Dr. H. Aldridge are continuing a long-term follow-up of surgically treated patients. They have been interested in the post-commissurotomy syndrome and they are attempting to measure the amount of regurgitation of blood which occurs in patients with aortic insufficiency, using a dye technique and also cineangiography. An approach is being made to the problem of visualizing the coronary arteries. Dr. E. D. Wigle has studied a series of patients with obstruction to the outflow from the left ventricle proximal to the aortic valve due to muscular hypertrophy. He is also investigating the problem of pulmonary hypertension from various points of view. Dr. Ramsay Gunton continues his work on indicator dilution techniques in a study of mitral regurgitation before and after operation, involving catheterization of both the right and the left sides of the heart and study of the curves obtained by injection of dye in various areas. Attempts are being made to measure coronary blood-flow using radioactive isotopes and cineangiography. Dr. K. W. G. Brown and Dr. R. L. MacMillan have been working on various aspects of anticoagulation therapy in coronary heart disease and are comparing the various methods available for measuring the effects of these drugs. A combined study of the usefulness of various plasma concentrates available for the treatment of haemophilia is being carried out by Dr. R. L. MacMillan, Dr. J. H. Crookston, and Dr. Fraser Mustard. Dr. John Morrow is studying the problem of hypertension. Dr. John R. Evans spent the past year working in Boston with a technique which allows measurement of the utilization of sugar, fat, and amino acid by heart muscle.

At the Toronto Western Hospital, Dr. Susan Lenkei has been working on a number of problems. A plethysmograph is being used to study patients with peripheral vascular disease before and after operation. Haemodynamic studies, which involve the phonocardiograph (intracardiac and extracardiac), and analysis of pressure tracings are being carried out in several disease states. A new dye (Coomassie Blue) is being tested. A metabolic study of patients undergoing cardiac surgery with an extra-corporeal pump is being carried out. Improved methods for gas analysis are being evaluated. Dr. A. J. Kerwin, Dr. A. W. Chisholm, and Dr. Ross McLean have studied electrocardiograph changes which occur in certain patients as a result of exertion or after a period of anoxia, in an attempt to determine which has the most diagnostic or prognostic significance. An out-patient clinic is being conducted for the treatment and study of hypertension. Dr. D. R. Wilson, of the Department of Surgery, with Dr. McLean and Dr. Knowlton are carrying out animal experiments to determine the feasibility of inserting a wire conductor from the atrium to the ventricle in dogs, in the hope that this might have some application to the problem of complete heart block.

At the Wellesley Hospital, Dr. D. P. Murnaghan has been provided with a sound-damped room in which to study the recording and reproduction of heart sounds. He is also studying the electrocardiographic changes seen in patients with hypercalcaemia.

At St. Michael's Hospital, Dr. H. P. Higgins and Dr. P. Forbath have been evaluating an aldosterone antagonist in patients with severe oedema. They are also measuring the blood volume in patients during and after cardiac surgery. Dr. J. A. Little and Dr. Stephen Slessor have demonstrated a reduction in glucose tolerance in a series of patients who have suffered from coronary thrombosis, using a special test. Dr. J. K. Wilson, Dr. D. B. Moran, Dr. H. Fields and Dr. P. Forbath are participating actively in the investigation and selection of patients for open heart surgery. A series of patients with subacute bacterial endocarditis have been treated successfully with oral penicillin. A follow-up study of patients with Marfan's syndrome is being carried out. Dr. Fields is engaged in an investigation of the epidemiology of coronary artery disease.

Respiratory Function

Dr. C. R. Woolf has been working in this field at both the Toronto General Hospital and Sunnybrook Hospital. An investigation as to the mechanism of cardiac dyspnoea and of dyspnoea in normal people is being carried out. At the same time a group of patients with operable cardiac defects is being studied from the point of view of pulmonary function before and after surgery in an attempt to identify criteria which will be of prognostic significance, and to forecast the need for special post-operative care in the ones who show marked impairment of pulmonary function to begin with.

Endocrinology

(*a*) *Thyroid disease.* At the Toronto General Hospital, Dr. M. W. Johnston, Dr. C. Ezrin, Dr. R. Volpé, Dr. P. Walfish, and Dr. W. G. Nicholas, with the assistance of Miss Amy Britton, have studied the thyroxin-combining capacity of serum in patients with various types of thyroid disease. They have also investigated the rate at which radioactive thyroxin disappears from the circulation. Diurnal variations in thyroxin level have been detected which were not known to exist before. A study of the pathogenesis of Graves' disease involves collaboration with the Department of Pharmacology. A search is being made for evidence of an abnormal factor in patients' serum which leads to overstimulation of the thyroid gland. In collaboration with the Department of Pathology, a study on antithyroid antibodies is also being carried out. Dr. M. W. Johnston has published the results of his survey of hyperthyroid patients treated with radioactive iodine.

At the Toronto Western Hospital, measurements of serum thyrotropin are also

being carried out. Dr. R. H. Sheppard is studying the transfer of hormones across the placenta, and reviewing the natural history of solitary nodules in the thyroid.

At St. Michael's Hospital, Dr. H. P. Higgins and Dr. T. A. Bayley have been carrying out thyroid biopsies with a special needle. A study of subacute thyroiditis is being conducted. A new treatment with triiodothyronine is being compared with cortisone treatment.

At the Women's College Hospital, Dr. Joan Vale is measuring the effect of treatment with thyroid substance on the function of the patient's thyroid gland. She is also using thyroid treatment as a means of suppressing nodules.

(*b*) *Other endocrine studies.* Dr. J. C. Laidlaw, Dr. J. Ruse, and Dr. D. Killinger are studying the relationship of aldosterone to hypertension produced in various ways in the human being, and investigating the effect of aldosterone antagonists, including progesterone. Methods for studying the secretion rate of such hormones, as well as the excretion rate, are being developed. A large number of patients have been studied in the Clinical Investigation Unit, each of whom constitutes a minor research problem in himself. The eight beds in this Unit have been occupied to the extent of 90 per cent throughout the year. We are grateful to Miss Janet Oaks, R. N. (Head Nurse) and Mrs. Lenore Solway (Dietitian) for the part they have played in making it possible to carry on the work.

At the Princess Margaret Hospital, Dr. J. W. Meakin has been studying the endocrinological aspects of patients who have neoplastic disease.

Renal Disease and Metabolism

(*a*) *Electrolyte metabolism.* Dr. E. R. Yendt, Dr. Thora Lee, and Dr. Barbara Hunt are engaged in a variety of projects in this field. A diurnal variation of phosphate excretion has been noted in normal people which is absent in patients with hyperparathyroidism, and which has returned in most patients after removal of a parathyroid adenoma. This diurnal swing is exaggerated in a group of patients who have shown a tendency to form renal calculi. It has also been studied in patients with renal tubular acidosis and Cushing's disease. Nineteen patients suffering from hyperparathyroidism have been seen since 1954. From a laboratory point of view the most accurate indication of this disease is still accurately performed estimation of blood calcium. In collaboration with the Genito-urinary Division of the Department of Surgery, 200 patients with recurring renal calculi have been studied. Relationship of the serum magnesium to various clinical phenomena is being investigated. In one patient suffering from hyperparathyroidism, which appeared to be refractory to vitamin D therapy, the serum magnesium level was found to be very low, and responsiveness to vitamin D was restored by the administration of this element. Methods are being devised for the study of diffusable and ionizable calcium in the blood. The ability of the kidney to excrete excess acid is being measured in such conditions as hyperparathyroidism, osteomalacia, and aldosteronism with renal tubular defect. The identification of renal artery lesions in patients who have hypertension continues, and the patients so diagnosed have responded well to operation.

At the Princess Margaret Hospital, Dr. O. H. Warwick and Dr. J. W. Meakin have added the study of serum magnesium to the continuing investigation of hypercalcaemia in patients who have malignant disease.

Dr. W. T. W. Clarke and Dr. G. W. Smith have collaborated in the use of the artificial kidney at the Toronto General Hospital, together with a clinical appraisal of the problems of acute renal failure. At the Toronto Western Hospital similar work is going on as a collaborative effort involving the departments of Medicine and Surgery as well as the laboratory section. In both these hospitals increasing use is being made of the technique of renal biopsy to elucidate problems of kidney disease. At the Toronto Western Hospital, Dr. A. Rapoport, in collaboration with Dr. D. R. Wilson and Dr. G. N. Ranking, is making an experimental approach to the problem of renal artery occlusion and its relation to hypertension. Dr. G. W. Smith is performing renal biopsies at the Wellesley Hospital, particularly in relation to diabetes. At

the Women's College Hospital, Dr. F. M. Hill is devoting her attention to the significance of bacterial renal infections during pregnancy, both as regards the incidence of pyelonephritis and also the effect it may have in inducing premature delivery, etc.

Haematology and Neoplastic Disease

At the Toronto General Hospital a number of projects are under way which are being directed by Dr. J. H. Crookston. These include a study of the normal standards of haemoglobin, haematocrit, and red blood count carried out by Dr. R. Herst and Dr. H. A. Farquharson, an investigation of the coagulation mechanism in 126 patients about to undergo open heart surgery by Dr. H. A. Farquharson and Dr. Sapirstein, investigation of a new type of liver extract by Dr. Farquharson, evaluation of a new tissue thromboplastin reagent by Dr. R. Herst, and an exhaustive test of the accuracy of two types of automatic blood cell counter with respect to red and white counts by Dr. A. E. Croal and Dr. V. Waldorf. In addition, Dr. Crookston, together with Dr. R. L. MacMillan and Dr. Fraser Mustard, are participating in a co-operative study of various types of material provided by the Red Cross for the treatment of patients with haemophilia. In the Blood Transfusion Laboratory, Miss B. Croucher has investigated a number of irregular agglutinins in blood and compared the behaviour of antibodies of the various blood group systems. Criteria used include their ability to sensitize cells to the action of antiglobulin sera compared in various ways, their ability to bind complement, and their ability to react with red cells treated with a number of proteolytic enzymes. Mrs. J. Crookston has been able to prepare antiglobulin antibodies, using various fractions of serum as antigen, to be used in these studies. Investigation of haemolytic anaemia has included studies of the mechanism of red cell destruction, measurement of serum protein and haptoglobin changes. Immunologic responses to injected fractions of human serum or of A.H.G. of animal origin are also being studied.

A group of patients with advanced malignant disease are being treated by a combined injection of vincablastine and Thio TEPA, followed by radiation. This is being carried out by Dr. Wightman, Dr. D. Cowan, and Dr. R. Wensel. Exploration of the value of fractions derived from royal jelly in neoplastic disease is being continued by Dr. Hazlett.

At the Western Hospital, Dr. Dorothy Ley is investigating the influence of neoplastic disease on iron metabolism, serum proteins, and vitamin B_{12} absorption and their response to a number of cytotoxic agents. She has also been concerned with alterations in the coagulation mechanism which occur with the use of an extracorporeal pump. The influence of hypothermia in cardiovascular surgery on bone marrow kinetics is under study, as is the effect of long-term anticoagulant therapy on the coagulation pattern of the blood.

At the Princess Margaret Hospital, Dr. Warwick and his associates have been testing the value of vincablastine in patients with a number of malignant processes. Dr. E. A. McCulloch and Dr. J. Darte are investigating the application of lethal doses of radiation plus marrow transfusion. Dr. Alan Bruce-Robertson is collaborating in the investigation of the acute radiation syndrome.

At St. Michael's Hospital, Dr. C. J. Bardawill continues his work on serum and intracellular enzymes in leukemia and neoplastic diseases, as well as a measurement of various steroid fractions in the urine of this group of patients. Dr. K. R. Butler is analysing data on a series of patients with multiple myeloma.

Gastrointestinal Disease

At the Toronto General Hospital, Dr. J. M. Finlay and Dr. D. C. Mortimer are working on problems having to do with intestinal malabsorption of both primary and secondary types. Bacteriologic findings of considerable interest have been made in patients with diabetes and other conditions. Use is being made of the jejunal biopsy and a start made on the investigation of these with the electron microscope, in collaboration with Dr. Movat and Dr. Steiner of the Department of Pathology. A search

for antibodies to pancreatic tissue in patients with acute pancreatitis has been initiated. Dr. J. C. Sinclair has endeavoured to apply the technique of fluorescent antibodies to the problem of infectious hepatitis, working in collaboration with colleagues in the Department of Bacteriology. Dr. C. B. Brown has investigated the clinical application of various antacids and antispasmodic drugs.

At the Wellesley Hospital, Dr. G. A. Gow, with Dr. J. E. Mullens, has completed a ten-year follow-up of patients who have suffered haemorrhage from a peptic ulcer. He is also investigating patients suffering from jaundice.

At St. Michael's Hospital, Dr. P. O'Sullivan and Dr. Caroline Hetenyi are also working on the problem of intestinal malabsorption. In addition investigations of the motility of the oesophagus, using pressure transducers, are being carried out. A survey of hiatus hernia has been conducted with Dr. M. Malyon, and the use of the Menghini needle for liver biopsy explored with Dr. F. Meligranna.

Neurology

A new Neurology Unit has been opened at the Toronto General Hospital under the direction of Dr. J. C. Richardson. Research work in the field of Parkinson's disease has been generously supported by a gift in memory of Helen Scott Playfair. This is to be a collaborative effort. Dr. J. G. Humphrey has established a laboratory for electromyography and for the study of muscle and nerve biopsy. He has been investigating the treatment of acute infectious polyneuritis with adrenal steroids and studying the electrical reaction in myasthenia and in various types of acquired myopathy. Vital staining techniques and histochemical methods are being applied to the investigation of peripheral nerve and muscle.

At the Toronto Western Hospital, Dr. A. M. Park and Dr. J. S. Crawford are conducting a survey of nerve-muscle disorders and peripheral nerve injuries. With the collaboration of Miss D. McGeachy, a series of patients with aphasia who have received intensive speech therapy are being compared with another group in whom this treatment has not been used. The evaluation in the speech of patients with Parkinson's disease before and after surgical therapy of their disease is also being carried out.

Dermatology

Dr. Norman Wrong has carried out an investigation of a new form of griseofulvin in dermatomycoses. Dr. Wrong and Dr. Mark Rosset have also investigated the use of beta-methazone phosphate in chronic dermatoses. Dr. Nemethy gathered together a comprehensive collection of pathological slides illustrating the various skin disorders, which should be of great value in teaching.

At the Princess Margaret Hospital, Dr. Murray G. Williams has studied the virus which produces common warts by various means, including electron microscopy. He is also investigating a new fluorescent dye in the diagnosis of dermatophyte fungi.

At the Western Hospital, Dr. H. C. Hair and Dr. L. Martin are investigating skin changes which occur with age.

Psychiatry

At the Toronto General Hospital, Dr. Walters has published the results of an investigation of psychogenic pain mechanisms. Dr. P. H. Melville is studying the population of the Medical Out-Patient Department with regard to variations in symptomatology which are found in the various ethnic groups attending the Clinic, and is also carrying out an analysis of the psychiatric referrals coming from a general medical clinic.

Clinical Chemistry

Dr. W. R. Campbell has devised practical methods for the identification of carboxymethaemoglobin and other haem-compounds by using the hand spectroscope.

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OBSTETRICS AND GYNAECOLOGY

Under the direction of Professor D. E. Cannell

In the course of the past year, changes have been made in the teaching of fourth year which have improved the scope and content of rounds at the Toronto General

Hospital. Dr. Crawford Shier's committee which has been studying the undergraduate and postgraduate programme has made certain recommendations for changes in teaching at both levels. These will be implemented in the course of the next academic year.

A smaller committee has met on several occasions to discuss a programme for prospective clinical studies in all teaching hospitals. This will be initiated in 1961–62.

The Department is pleased to report the success of Dr. J. R. Birchard, Dr. T. A. Doran, Dr. W. J. Hannah, Dr. E. Dawne Jubb, Dr. D. C. Moore, Dr. F. J. Skain, and Dr. R. Wilson in obtaining Fellowship in the Royal College of Physicians and Surgeons of Canada.

The Department was honoured by visits from Dr. S. K. Char, Bombay, India; Dr. John H. Dickinson, Vancouver, B.C.; Dr. Nicholas Eastman, Baltimore, Maryland; Mr. V. B. Green Armytage, London, England; Dr. E. D. Hull, Hobart, Tasmania; Dr. S. V. Joglekar, Bombay, India; and Professor Robert J. Kellar, Edinburgh, Scotland.

The Department entertained the Michigan Obstetrical and Gynecological Society and the newly formed Canadian-American O.G. Travel Club.

In March, the American Association of Obstetricians and Gynecologists held their Mid-Winter Clinical Meeting in Toronto. Dr. D. M. Low was responsible for the local arrangements with the assistance of Dr. Gerald Cosbie and Dr. D. N. Henderson. The Department wishes to acknowledge its gratitude to them and to thank the staff and the Director of the Princess Margaret Hospital, Dr. Clifford L. Ash, for the co-operation which they have extended in such programmes during the past year.

The usual staff participation in scientific meetings at all levels has continued without change.

There has been no evidence in the past year of any adverse effect of hospitalization insurance upon our teaching programmes. Certain steps have been taken to ensure that this satisfactory situation continues.

New out-patient facilities have been made available at the Toronto General Hospital and Toronto Western Hospital which are comfortable and attractive. These should improve the care and morale of patients by facilitating their examination and dismissal. The Department is grateful to the trustees of these institutions for their consideration in this regard.

Dr. D. C. Moore and Dr. W. J. Hannah have been appointed to the active staff of the Women's College Hospital in the Department of Obstetrics and Gynaecology. This break with tradition in this institution was made necessary by the lack of women obstetricians and gynaecologists. Since the initiation of the programme for postgraduate education in Obstetrics and Gynaecology in Toronto, only one woman has taken advantage of the opportunity to take the required training. It would seem that as openings in less arduous fields of practice have been extended to women, Obstetrics and Gynaecology has *not* maintained its initial appeal to female members of the profession. The addition of these men to the staff completes the requirements of University staff in our department of the Women's College Hospital.

The Department records with great regret the death of Dr. John Mann on November 4, 1960. He had been a member of the Department since 1931. He became ill in May and made an apparently good recovery, resuming his responsibilities in practice and in the Department in the fall. His death occurred suddenly in Detroit as he was preparing to address the Academy of Medicine there. In the course of his service with the Department, John Mann proved a vigorous, stimulating teacher and a thoughtful, loyal colleague. A generation of students and housemen will remember his wit, wisdom, and good will.

The Head of the Department wishes to thank all his colleagues in the Department, Faculty, and University for their generous co-operation and assistance during the past year.

Research

Members of the staff have undertaken the following research work:

Dr. W. H. Allemang has made a survey on pregnancy in the absence of adrenocortical function and presented a paper at the Annual Meeting of the Royal College of Physicians and Surgeons in Ottawa in January 1961.

Dr. M. L. Bunker has made a survey on osteoporosis in conjunction with the departments of Orthopaedics and Radiology at the Toronto Western Hospital.

Dr. J. L. Harkins has completed a double-blind study of the effectiveness of Dimenhydrenate (Gravol) in patients in labour, covering approximately 350 cases. He has also made a retrospective study of foetal and maternal morbidity of cases delivered by Caesarean section after trial forceps, in conjunction with Dr. D. N. Kerr. A study of cases of abruptio placentae on the Public service at the Toronto General Hospital is continuing. Other work in progress includes a preliminary study of the use of synthetic oxytocin as a milk let-down agent; an assessment of the effect of newer progestational agents on the vaginal cytology, endometrium, and pregnandiol excretion, in co-operation with Dr. D. Thompson of the Department of Pathology and Dr. R. Wilson of the Department of Pathological Chemistry. A study of the genetic pattern of patients complaining of amenorrhea has begun on a small scale, and it is hoped that, with the co-operation of the Department of Genetics at the Hospital for Sick Children, this investigation will be expanded.

Dr. J. A. Low and his colleagues have completed their studies on oxygenation and the metabolic state of the foetus at delivery in patients without obstetric abnormalities. The study is now being extended in relation to these findings in association with obstetric abnormalities. A further phase of their investigation into metabolic acidosis as seen in the new-born has been initiated. Studies of haematological values and blood volumes of the new-born have been continued. Studies on urinary incontinence have also been continued.

Dr. W. M. Paul and his colleagues have completed their preliminary studies on amniotic fluid in animals. These have indicated that the constituents of amniotic fluid change in a predictable fashion secondary to a decrease in uterine circulation. It has been found that these changes in amniotic fluid are more likely due to anaerobic activity in uterine muscle than to extensive anaerobic activity of the foetus. This work was reported to the Society for Clinical Investigation in Ottawa in January 1961. Studies in human amniotic fluid have now begun. These fluids are obtained at the time of Caesarean section and by trans-abdominal puncture at various times before and during labour. Experience with this technique is increasing and the present programme intends to attempt to relate observations in fluid to certain complications of pregnancy and to certain stages in labour. Observations on amniotic fluid have widened and now include the direct measurement of oxygen tension in amniotic fluid, using a modified Clarke electrode. With this added technique, it is now possible to attempt to relate amniotic fluid oxygen tension to the oxygen tension in the umbilical artery and vein of the new-born. Using the pregnant ewe, a series of experiments have been performed in an attempt to determine the specific foetal sources of amniotic fluid water. Tritriated water was used as a tracer in a preparation with the foetus exteriorized. It has been possible to show at this time that both cavities communicating with the head and neck and umbilical cord are sources of amniotic fluid water. Other possible sites of amniotic fluid water will be investigated during the sheep season in 1962.

Dr. Joslyn Rogers has completed a review of pregnancy in the diabetic woman and presented a ten-year survey of his results at the Society of Obstetricians and Gynaecologists of Canada in June 1961.

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OPHTHALMOLOGY

Under the direction of Professor A. J. Elliot

The graduate training programme in ophthalmology in the University was actively continued in 1960–61 with sixteen students registered in the formal three-year course and one occasional student. Dr. J. C. C. Alexander, Tillsonburg, Ontario, and Dr. G. J. Jarvis, Ottawa, were appointed Canadian National Institute for the Blind Fellows. Dr. D. H. Green, Winnipeg, was appointed a Fellow under a Defence Research Board Grant and Dr. D. E. Sillers, Toronto, was appointed a Fellow under a Public Health Grant. Dr. W. G. Hutchison, Winnipeg, commenced training at the Toronto General Hospital. Six students completed their graduate studies: Dr. S. R. Frankling, Orangeville, Ontario, Dr. G. S. Harris, Cranbrook, B.C., Squadron Leader D. E. MacLeod, R.C.A.F., Dr. D. J. McDonald, Cornwall, Ontario, and Dr. W. D. Samis, Toronto. Dr. Alain Rousseau, Quebec City, completed his training at Sunnybrook Hospital.

Dr. G. D. Howden from the University of Saskatchewan, spent one month as an occasional student and Dr. Policarpo de Jesus from the Philippines, registered as an occasional student under the auspices of the Colombo Plan.

The undergraduate training programme in the third medical year continued its emphasis on ophthalmoscopy under the direction of Dr. H. M. Macrae and Dr. T. H. Hodgson. In the fourth year the emphasis in ophthalmology was placed on the role of the ocular manifestations in the diagnosis of systemic medical diseases.

The First Clinical Convention of the University of Toronto Eye Alumni was held in November and was very successful. This meeting was combined with the Walter W. Wright Lecture, "Anatomical Basis for Vertical Muscle Surgery," which was delivered by Professor Walter H. Fink, University of Minnesota. The senior residents contributed clinical papers of high quality and Dr. W. D. Samis was awarded the Alumni Prize for his paper. A number of the Alumni presented papers of unusual interest. The Alumni had an active year, issuing several newsletters. At their meeting in June they established a fund to be known as the "Professor A. J. Elliot Residents' Travelling Fund," which will permit senior residents to travel to medical societies to present results of their clinical studies.

During March the department sponsored an Eye Surgery Clinical Meeting which was well attended. The guest surgeons were Sir Benjamin Rycroft, O.B.E., London, England, and Dr. Robert N. Shaffer, University of California. A feature of the meeting was the symposia on keratoplasty, chlidren's eye diseases, and cataract surgery. The departmental research meeting, under the direction of Professor P. K. Basu, was held just prior to the Eye Surgery course. The guest of honour was Professor H. M. Burian, University of Iowa, and the programme included twenty research papers from members of the staff and guests. The volume of papers reflects the activity of the research in the department under the director whose work is supported in part by the generosity of Mr. H. G. Stapells, Q.C.

Members of the staff gave numerous lectures through the past year and visited many centres. Dr. A. J. Elliot was appointed to the Advisory Committee of the International Eye Bank and Dr. W. R. F. Luke was appointed to the Tonometry

Committee of the American Academy of Ophthalmology and Otolaryngology. The department received visits from Dr. Sydney Sunderland, Dean of Medicine, University of Melbourne, Australia, and Mr. John Chivers, F.R.C.S., London, England.

The department collaborated closely in the functioning of the Ontario Division of the Eye Bank during the past year. Exhibits from the Eye Bank and the Glaucoma Service were provided for the annual meeting of the Ontario Medical Association. A Contact Lens Clinic has been established at the Toronto Western Hospital under the direction of Dr. D'Arcy Macdonald through funds supplied to the hospital from the Atkinson Charitable Foundation.

The department is grateful for the grant of $2,988 from the J. P. Bickell Foundation to provide certain pieces of technical apparatus urgently needed in the research work in the department. In addition, the Selkirk Eye Research Fund was utilized extensively for research in prevention and treatment of blindness and for travel for personnel engaged in this work. The Alexander E. MacDonald Foundation generously supplied funds to purchase a large number of recent textbooks in ophthalmology for the departmental library. The department also acknowledges with gratitude the continued support of the Canadian National Institute for the Blind for Fellowships for two graduate students.

The Head of the Department, who is resigning at the close of the academic session, would like to record his gratitude for the magnificent co-operation he has received during the past fifteen years from his colleagues in the Department of Ophthalmology. In particular he would like to record his appreciation of the kind and helpful direction which he invariably received from the Dean of the Faculty of Medicine.

Research

Members of the staff have undertaken the following research work:

The National Health Grant for "Prevention of Blindness from Glaucoma" was continued under the direction of Dr. W. R. F. Luke. Dr. R. K. MacDonald and Dr. T. M. Sibay, with the assistance of Mrs. L. Schubert, are working on the connections of the outflow channels of the aqueous humour and they have developed a technique to stain the arteries, veins, and capillaries separately. These channels are being studied in three dimension and a sphincter-like structure has been found around these vessels which may have a role in the regulation of aqueous outflow. They are also trying to develop a new operative technique to control intraocular pressure in rabbits and monkeys. Dr. J. S. Speakman, with the assistance of Dr. T. S. Leeson of the Department of Anatomy, is studying the endothelial meshwork of the Canal of Schlemm in adult and infant eyes. This entails study of a special type of circular fibre around the trabecular strands under the electron microscope. Miss Susan Hennighausen is continuing tonography in the glaucoma laboratory and is also operating the tonometer testing station. There has been a considerable increase in the number of patients referred for tonography indicating its usefulness in the diagnosis of glaucoma and evaluation of therapy. Several technicians were referred from distant centres for training and study in the tonography laboratory. Dr. W. R. F. Luke and Dr. W. D. Samis have completed a study on the effects of phospholine iodide in experimental closed-angle glaucoma. They have observed that in rabbits phospholine iodide has no effect in lowering intraocular tension when the angle of the anterior chamber is blocked with methyl cellulose during a period of thirty minutes. They are continuing clinical work with this drug in the Toronto General Hospital.

The National Health Grant for "Studies on the Prevention and Treatment of the Ocular Complications of Diabetes" was continued under the direction of Dr. H. R. Hausler in a research unit set up jointly by the departments of Ophthalmology and Physiology. Dr. H. R. Hausler and Dr. T. M. Sibay are attempting to produce diabetic retinopathy in animals. Diabetes in animals has been produced by alloxan and by removing the pancreas. They are studying the effects of high oxygen tension,

low atmospheric pressure, vitamin E-free diets, thyroxin, high carbohydrate diet, intraperitoneal injection of urine from diabetic patients, glucosamine, arsenic, high doses of insulin, and snake venom. They have developed a technique to study blood vessels of the eye with silver stains and found out that high oxygen tension produced blood vessels in the diabetic animals but not any in normal animals. They are also studying the effects of bioflavin in patients with diabetic retinopathy at the Toronto Western Hospital.

Under the National Health Grant for "Eye Bank and Corneal Transplantation" Dr. P. K. Basu continued his studies on problems of corneal grafting and vitreous implantation with the assistance of Dr. G. J. Jarvis, Dr. D. E. Sillers, Miss Irene Miller, and Mrs. Ingrid Fielding. A comprehensive study on the cytology of the corneal and vitreous tissues is continuing. Investigation regarding the use of donor vitreous from patients who have died of cancer is being made to determine whether this material is free from cancer cells. The mode of cell division in the corneal and vitreous tissues is being studied in the embryo and adult of many species of mammals and birds. Dr. P. K. Basu, with the assistance of Dr. P. Sarkar of the Department of Botany, is studying the chromosomes of the corneal cells. It has been found that corneal tissue is very suitable material for karyological studies in mammals. They have also demonstrated alteration of the chromosomes of corneal endothelium cultured *in vitro* for a long time. Dr. R. R. Toews and Dr. P. K. Basu have completed a study on the donor eyes stained with bile pigment. Electrophoretic patterns of fresh and stored vitreous from different species of animal are being studied. Dr. G. J. Jarvis and Dr. P. K. Basu are studying the action of alphachymotrypsin on the corneal endothelium. Dr. D. E. Sillers and Dr. P. K. Basu are studying the behaviour of the vitreous cells following intravenous and intravitreal injections of different dyes. Healing of chemical injuries to the cornea and the repair of corneal wounds *in vitro* are also being studied. With the assistance of Dr. S. C. Chang of the Department of Pathology, Dr. T. M. Sibay and Dr. P. K. Basu are conducting investigation into the behaviour of tumour cells from Walker carcinosarcoma 256 in the ocular tissues of rats.

Mrs. A. Wolf, in conjunction with the Canadian National Institute for the Blind, has been energetically obtaining eyes for the Eye Bank. At the Eye Bank laboratory in the Banting Institute, under the supervision of Dr. P. K. Basu, the donor materials are examined and processed before they are distributed to the surgeons for corneal grafting and vitreous implantation. A special corneal research clinic has been established in the Toronto General Hospital under the direction of Dr. G. A. Thompson with the collaboration of Dr. W. P. Callahan, Dr. J. C. McCulloch, and Dr. P. K. Basu. It is planned to investigate the causes of certain corneal lesions and to evaluate the indications for the use of frozen corneal donor material and to compile data concerning the over-all results of corneal grafting.

The National Health Grant for "Biochemical Studies of the Cornea" was continued. Dr. Nina Morley and Dr. J. C. McCulloch have completed a study on the effect of contact lens on the metabolism of corneal tissue. In this work they have shown that the levels of lactic acid in both corneal epithelium and stroma were significantly higher for rabbit cornea with contact lenses for three days than for control animals without contact lenses.

Under a National Health Grant "Clinical Investigation of Idiopathic Retinal Detachment" Dr. M. Shea is directing a retina clinic at St. Michael's Hospital. With the assistance of Dr. D. E. Sillers, Dr. Shea is continuing clinical investigation on idiopathic retinal detachment. He is attempting to improve magnification of the indirect ophthalmoscope and trying to incorporate a binocular indirect system in the light coagulator.

Under a Defence Research Board Grant awarded to Dr. J. C. McCulloch, Dr. D. H. Green is working with Mr. J. P. Foley of the Defence Research Board on the effect of noise on colour vision.

A new National Research Council Grant has been awarded to Dr. P. K. Basu to carry out an investigation on the intraocular penetration of steroids.

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OTOLARYNGOLOGY

Under the direction of Professor P. E. Ireland

During the past year the Department of Otolaryngology has continued with its graduate teaching which is now on a four-year basis and includes one year training in general surgery. This year is taken after a year of induction into our specialty and has been largely arranged through the services of the Department of Surgery. We do find that the graduate student is much better fitted to continue his training in the broader field of otolaryngology as it is now practised with the basic training in general surgery thus obtained. The law of supply and demand is now giving us a most generous number of applicants to choose from for our training programme. The undergraduate training has been gradually dissociated into more of a block system in the various hospitals and it is hoped that eventually our subject can be decentralized and taught as a clinical entity in the hospital to which the student is attached.

The main emphasis in the department has been, during the last two years, on an attempt to establish a research centre in our specialty. We have been quite pleased with the fact that we have been able to again retain the full-time services of Dr. J.

Farkashidy under an extended N.R.C. Grant. In addition we have added two more technicians and Dr. Elizabeth McKee has continued to do half-time research under a National Health Grant. The Alcoholism Research Foundation has seen fit to donate a generous amount of money to the support of a research project on the effect on the labyrinth of alcohol both as to hearing and as to vertigo. This was conducted by Dr. Roland Lee (who had previously three years' research experience), on animals in the laboratory in the Banting Institute and the clinical part of the investigation in St. Michael's Hospital. This study has provoked interest in that it has confirmed research which was done in Sweden and also has continued well beyond the conclusions which were made in that country. It is hoped that this will be continued for another year by Dr. Yuichi Nito who is coming from Japan to work in our laboratory. He was previously six years in the United States.

The course in Speech Pathology and Audiology has continued with our support under the Department of Rehabilitation Medicine. One of the graduates of last year is employed at Sunnybrook Hospital and one of this year will be employed at the Toronto General Hospital in the new Audiology Centre which has been established there. This has the very latest equipment for the testing and assessment of the deaf patient, the soundproof area being supplied by the hospital and the equipment by a special grant to the University of Toronto by the late André Dorfman.

Awards supported by the Cancer Foundation with regard to speech of the laryngectomised patient have increased so much that a further assistant, with a Ph.D. from the University of Iowa, will be added to the staff. It was felt also that there was no provision made for prosthetic appliances in cancer and other patients. During this year Dr. D. P. Bryce was sent by the Cancer Foundation and with our approval to visit the various centres in England where this work was done. On his trip abroad he also had the opportunity to study the treatment of cancer in the various British organizations in the area specially related to our department. We now have a prosthetic laboratory being set up in the Princess Margaret Hospital where work will largely be associated with defects due to radiation and surgery in our field.

The research and evaluation of hearing loss in children has continued at the Hospital for Sick Children under Dr. J. B. Whaley and Dr. Page Statten. A new research endeavour in the younger age group which includes those between six months and the pre-school age is in process of assessment. Dr. Page Statten was sent by this department to England to study the methods used in this regard in the British Isles under an anonymous gift to our Department in the University. The recent combined research with Dr. J. D. L. Fitzgerald of the Department of Allergy and under Dr. Douglas Bell continues at the Toronto Western Hospital.

Dr. Joseph A. Sullivan, former Assistant Professor in this department and Otolaryngologist-in-Chief at St. Michael's Hospital, has continued to have an interest in our work although he is now on the Board of Governors of the University and in the Senate of Canada. The Sullivan Research Fund for Audiology and Vestibular Problems with the laboratory under his name is firmly established at St. Michael's Hospital. The most modern equipment has been installed for the accurate measurement of vestibular changes and for the testing of these. This work is largely under Dr. Walter H. Johnson with the assistance of Dr. Farkashidy and Dr. McKee. It opens up a whole field of vestibular investigation. In addition to this, Dr. Johnson and Dr. McKee are working on whip-lash injuries and their effect on vertigo. This work will be done at St. Michael's and at the Banting Institute.

The close association of Dr. Johnson of our department with the Defence Research Medical Laboratories and the Department of Physiology has resulted in a project in which operative procedures on the labyrinth of the cat have helped greatly in the localization of impulses which are associated with the otolith. This has largely been done at Defence Research Laboratories. One graduate student has obtained his Ph.D. degree for experiments done on non-auditory function of the labyrinth under Dr. Johnson and Dr. J. W. Scott of the Department of Physiology.

The Head of the Department has been re-elected to the Council of the Royal College of Physicians and Surgeons of Canada and as Vice-President of the American

Otolaryngological Society. He continues as a Member of the Board of Directors of the American Board of Otolaryngology. Professor Ireland and Dr. G. Arnold Henry have been made Honorary Members of the Scottish Otolaryngological Society. Dr. J. A. Sullivan has been elected as Vice-President and President-Elect of the American Otological Society and to the Council of the American Triological Society.

Many papers have been given by members of the department. At the recent meeting of the combined societies at Lake Placid, New York, two important research papers and one clinical paper were presented. At the International Congress of Otolaryngology to be held in Paris in July 1961, there will also be two papers of scientific and research interest and one clinical paper presented by our Department of the University of Toronto.

In addition, various other talks have been given to both regional and international societies. Dr. G. A. Henry presented a paper at the American College of Surgeons, Dr. Blair Fearon gave papers at the Pan American Congress at Miami Beach in March and at the American Broncho-esophagological Meeting at Lake Placid. Dr. R. D. Bell gave a paper on vertigo to the Thunder Bay Medical Society in February. Mr. W. E. Hodges spoke on the "Relationship of Age and Flying time to Hearing Loss in Canadian Civilian Pilots" at the Aerospace Medical Association in Chicago. Dr. D. P. Bryce spoke on "Carcinoma of the Maxillary Sinus" at the Annual Meeting of the Ontario Cancer Foundation at Hamilton. Dr. W. H. Johnson and Dr. Brydon Smith spoke on "Acceleration as a means of Determining the Sensitivity of the Components of the Non-Auditory Membranous Labyrinth" at the American Otological Society at Miami Beach and Dr. Johnson also gave a paper before the Collegium Oto-Rhino-Laryngologicum at the University of Padua, Italy.

In May 1961 a three-day refresher course in Otolaryngology was given by this department. This was held in sequence with the Section of Otolaryngology of the Ontario Medical Association to whom we supplied the services of our two guest speakers. These were Dr. Philip E. Meltzer, Professor of Otolaryngology, Harvard Medical School, and Chief of Otolaryngology, Massachusetts Eye and Ear Infirmary, and Dr. W. G. Hemenway, Associate Professor of Otolaryngology, University of Chicago. The course was fully subscribed and proved to be quite successful.

During the year we had visits from a number of distinguished Heads of Departments, most of whom delivered lectures to our graduate group and to various other bodies in the Medical School and Academy of Medicine, Toronto. These were: Mr. C. P. Wilson, Middlesex Medical School; Mr. Terence Cawthorne, King's College, London; Dr. I. Simpson Hall, University of Edinburgh; Professor Gosta Dohlman, Lund, Sweden; Dr. Gordon Hoople, University of Syracuse; Dr. H. F. Schuknecht, Professor-Elect, Harvard Medical School; and Professor Walter Becker, Mainz, Germany.

The Head of the Department wishes to thank all of his staff for their full co-operation throughout the past academic year and to include in this the Research Fellows, secretaries, and technical staff.

Research

The various research projects in this department are co-ordinated under Dr. Walter H. Johnson who is also associated with Defence Research Medical Laboratories and the Department of Physiology. Under his direction the laboratories at Defence Research Board, the Banting Institute and the Vestibular Centre in St. Michael's Hospital are inter-related in both animal and patient investigation.

Dr. Joseph Farkashidy continues under a National Research Council Grant to study the organ of Corti and peripheral vestibular receptors with the aid of the electron microscope. These studies have developed into animal experimentation in an attempt to show for the first time that efferent nerve fibres do exist in the vestibular end-organs. This has been successfully proven and the results presented at the American Otological Society's Annual Meeting in May, 1961. He has also studied the effects of various experimentally induced lesions of the membranous labyrinth.

Pathologic intralabyrinthine tissue removed during operations on Menière patients has been examined routinely in the last year and the findings of this work will be summarized and presented at the International Congress of Otolaryngology in Paris in July 1961.

Dr. Johnson, with the assistance of Dr. Brydon Smith, has continued the operative procedures on experimental animals with regard to investigating the role of the otolith imbalance. Dr. Elizabeth McKee has also worked with Dr. Johnson in the evaluation of various types of vestibular lesions by the use of the new calibrated apparatus supplied to St. Michael's Hospital through a National Health Grant. The results of some of the experiments here and in Defence Research have been used by the group engaged in Project "Mercury" which is largely that of preparing man for space travel. Dr. Johnson is a consultant to the American Navy and regularly commutes by air between here and Pensacola, Florida, in order to take part in this project. A paper on some of the unclassified material of this work was given at the American Otological Society's meeting in May 1961.

Dr. Roland Lee, on a grant from the Alcoholism Research Foundation, has been conducting a series of experiments on animal and voluntary patients to find the effect of alcohol intoxication. This has produced not only important evidence that biochemical tests can be co-related with those of the breathalizer, but also that these levels can be associated with the amount of measurable vertigo and inco-ordination present in the subject.

At the Hospital for Sick Children Dr. Page Statten has continued his research in the Children's Hearing Clinic. In the past two years two problems have attracted special interest there: maternal rubella and deafness in the infant and the problem of hearing defects in the cleft-palate child. It is hoped that additional funds will be available for the investigation and treatment of the deaf and hard-of-hearing child of pre-school age. Investigations are now under way as to the best method in which this might be conducted.

At the Toronto General Hospital Dr. H. O. Barber has continued his investigation of vestibular problems as related to special diagnosis in head injuries and neurosurgical cases. He has also joined in the investigation team working in the acute respiratory paralysis unit.

Dr. R. D. Bell of the Toronto Western Hospital has continued to work along with the Division of Allergy in the investigation of vasomotor rhinitis and allergic problems of particular interest to the otolaryngologist.

Publications

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PAEDIATRICS

Under the direction of Professor A. L. Chute

A number of changes have been made in the teaching programme of paediatrics. In the final year students have been assigned to a service where they perform most

of the functions of a junior interne. The number of students assigned to any one service does not exceed three, which allows for considerable individualization in teaching.

Students make rounds with the staff and residents and are responsible for the follow-up on patients which have been assigned to them. Each day at noon two or three students in turn present to the whole student group cases which they have been following. A number of the staff and resident medical officers attend and take part in the discussion. Each student is also given specific duties in the Out-patient Department.

Third year teaching has been slightly modified towards giving more clinics on the wards in place of group demonstrations. The large size of the class, 40 students, together with the presence of the fourth year on the wards makes it difficult to implement this fully.

A two-week course on problems of the new-born was given for paediatricians during the fall as well as a three-day refresher course for general practitioners. In May 1961 a special course on Paediatric Emergencies was given in conjunction with the American Academy of Pediatrics. Sixty physicians from all parts of North America and a number from South America attended these sessions.

The University and the children of Canada suffered a great loss last autumn in the passing of Dr. Alan Brown. As Professor of Paediatrics Dr. Brown pioneered and led paediatric practice and teaching from humble beginnings to the front rank of medical achievement in Canada. We also acknowledge with regret the passing of Dr. Raymond Smith, former Head of the Department of Dermatology, and Dr. T. B. Verner, a faithful clinician and teacher.

Dr. Richard Rowe, a most valuable member of our Cardiac Service, resigned to return to his native land, New Zealand. His place has been taken by Dr. R. Fowler.

We were pleased to extend jointly with the Department of Zoology an appointment as Associate Professor in Human Genetics to Dr. T. E. Reed, formerly of Ann Arbor.

Dr. C. Collins-Williams was guest speaker at the Hansel Foundation postgraduate course in St. Louis. Dr. J. H. Ebbs lectured at the Mid-South Postgraduate Medical Assembly in Memphis. Dr. J. D. Keith gave a series of lectures on congenital heart defects at the Hospital dos Servidores do Estado, Rio de Janeiro. He also lectured at the University of Puerto Rico, and Mercy Hospital in Pittsburgh. He took part in a round table discussion at the American College of Cardiology, and gave a paper before the American Heart Association. Dr. A. Sass-Kortsak presented a paper at the International Symposium on Wilson's Disease in London, England. Dr. R. Slater gave lectures at the Graduate Education Center of the University of Minnesota, the Ciba Symposium on Renal Biopsy in London, and also at the Universities of Birmingham, Manchester and Aberdeen.

Research

In the Hospital for Sick Children, research is organized into a separate department in which the various services participate. A number of full-time research personnel also hold teaching appointments in paediatrics, and paediatric appointees are given facilities in the Department of Research.

Dr. A. Sass-Kortsak, after nine months study leave in Sweden at the Wenner-Grens Institut, is continuing his studies on the enzyme system of the red blood cell and the elucidation of the basic disorders in Wilson's Disease.

Dr. D. Fraser continues his investigations on calcium homeostasis and problems related to ossification. It is a pleasure to note that he received the Borden Award for Nutrition at the Annual Meeting of the Federated Societies.

Dr. R. Slater has continued his studies on renal disease and the problems associated with the production of autoimmune reactions.

Dr. S. H. Jackson, for many years a bulwark in the biochemical control of paediatric research, has resigned his paediatric appointment. Fortunately, his services are still available to our staff and fellows in the hospital.

Dr. J. D. Keith and Dr. R. Fowler have continued the tabulation and analysis of various cardiac disorders in childhood. Dr. R. Rowe, and Dr. J. Evans, at the Ontario Veterinary College, Guelph, in co-operation with Dr. H. G. Downie, Dr. H. C. Rowsell, and Dr. H. D. Geissinger of the Department of Physiological Sciences, conducted a study of closure of the ductus arteriosus in new-born swine.

Dr. J. S. Prichard is studying factors contributing to febrile convulsions.

Dr. A. L. Chute and Dr. H. Ghadimi (Research Institute) have been making a survey of mentally defective children, using chromatographic techniques on blood, urine, and spinal fluid. An interesting new metabolic disorder of histidine has been uncovered. It is a pleasure to acknowledge Dr. Andrew Hunter's (Emeritus Professor, Pathological Chemistry) part in the extensive determinations of histidine and its metabolites.

Dr. W. Hawke and Dr. M. Partington (Research Institute) have been studying the cases of phenylketonuria. Assessments of variation in mental deficit and the effects of low phenylalanine diets have been studied. In addition, a genetic survey has been made of these families. It is a pleasure to acknowledge Dr. Partington's appointment as the first Queen Elizabeth II Scholar. He will hold his appointment at Queen's University, Kingston.

Dr. J. D. Bailey and Dr. I. Radde (Research Institute) have perfected a haemagglutination technique for the measurement of human growth hormone in plasma.

Dr. H. W. Bain and Dr. A. Rebhan have been studying the effects of insulin hypoglycaemia as a factor in rebound hyperglycaemia in brittle diabetics.

Dr. D. Crozier has been showing the effects of various aerosols on the respiratory function of fibrocystic patients.

Dr. G. A. McNaughton and Dr. D. MacLean (Research Institute) have continued the search for aetiological causes for the numerous cases of infantile diarrhoea.

Dr. J. B. McKendry has devised a new apparatus for mobilizing children with Legge Perthes disease.

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PATHOLOGICAL CHEMISTRY

Under the direction of Professor James A. Dauphinee

During the session 1960–61 152 undergraduates in the third year of their medical course attended the lectures, laboratory classes, and seminars given in the first course in Pathological Chemistry and eight graduate students, taking Pathological Chemistry as a major or minor subject in the Graduate School, have been in attendance at the advanced course. One student in the Department was registered with the School of Graduate Studies as a candidate for the M.A. degree and nine were registered for the Ph.D. Two of the latter were awarded their degrees at the 1960 Fall Convocation after they had completed the requirements and had submitted the following theses: Mr. L. A. W. Feltham, "Studies in Muscle Electrolytes"; and Mr. T. Sandor, "Part A: Chromatographic Fractionation of the Lipidsoluble Extract of Urine from Children with Leukemia and Allied Diseases. Part B: Metabolism of Aldosterone by Surviving Dog and Human Liver Slices."

No significant changes have been made in the undergraduate teaching but the increasing emphasis on small group teaching mentioned in previous reports has continued. The newly reorganized advanced course for graduate students was well attended and dealt with recent concepts of such subjects as the etiological role of various hormonal and other factors in the development of hypertension, renal tubular function, medical uses of radioactive isotopes, immunochemistry and its relation to disease processes, trace metals, porphyrin metabolism, and the application of scientific methods to the problems of routine laboratory control.

RESEARCH

Reported by Professor Dauphinee

With the aid of Dr. Aly Khan at Sunnybrook Hospital Dr. Dauphinee and Dr. Gornall have continued their studies of the effect of the administration of various types of diuretics, including the aldosterone antagonists, on the renal excretion of water and electrolytes in cirrhotic patients with ascites. In a limited number of cases good results have been obtained with the spironolactone aldosterone antagonist "Aldactone," but in other patients this drug has had to be combined with a thiazide diuretic or with prednisone in order to obtain the desired effect. In the very limited series of observations which have been made up to the present time on the use of another aldosterone antagonist—a substituted progesterone which has been made available to us for study—the results obtained so far have been inconclusive. In a number of the patients studied in this programme aldosterone secretion rates have been determined by the use of tritium labelled aldosterone and the results suggest that the effectiveness of the aldosterone antagonists in increasing sodium (and water) excretion in these patients is inversely related to the rate at which aldosterone is being secreted by the patients' own adrenals.

Dr. Tobe has continued his investigations into the metabolism of the volatile amines with particular reference to diseases of the liver. His studies have shown that the ammonia which is measured in shed blood is made up of two separate components: ammonia which pre-exists as such in the circulating blood and is present in

it at the time of removal and ammonia which is produced in the blood after it has been removed, partly spontaneously and partly by the action of the reagents used to determine it. Of these two components it is felt that it is mainly the first that is related to the occurrence of hepatic coma in patients with liver disease. He has also shown that treatment of patients in hepatic coma with arginine glutamate is frequently associated with a decrease in the level of the pre-existing blood ammonia and with a definite, if sometimes only temporary, improvement in the clinical state of the patient.

Miss Margaret DeWolfe, in collaboration with Dr. S. Jackson and Dr. R. Slater of the Hospital for Sick Children, and using electrophoretic, chromatographic, and immunochemical techniques, has begun an intensive study of the a_2 component of the serum proteins in normal persons and in the different disease states in which this constituent of the serum proteins may be significantly altered.

Miss Amy Britton, in conjunction with Dr. Walfish, Dr. Volpé, and Dr. Ezrin of the Department of Medicine, has developed a quantitative method for the determination of the thyroxine binding capacity (TBC) of blood plasma. Approximately 100 such determinations have been made in normal persons and in patients with various forms of thyroid and liver diseases, during pregnancy and in other clinical conditions. It has been shown that in both hyperthyroid and hypothyroid patients the capacity to bind added thyroxine varies inversely with the level of the plasma protein bound iodine, but in patients with liver disease or pregnant patients this is not the case. Because of this very interesting difference further studies of the plasma thyroxine binding capacity and of the nature of the plasma proteins concerned are being carried out on such patients.

Reported by Professor T. F. Nicholson

Mr. Wright has been studying the amino acids of dog's urine and has found a number of differences between the pattern of excretion in the dog and the human. Two of the most striking are the large amount of citrulline and glutamine and the very small amount of glutamic acid in the dog's urine. He has also shown that the urine must be collected by catheter as it is excreted and analysed immediately because the combination of some amino acids to form peptides occurs quite rapidly in the bladder or on standing at room temperature.

Dr. Baines has been studying the distribution of various enzymes along the nephron. He has shown in nephrons isolated by micro-dissection that the alkaline phosphatase reported as being present in the glomerulus is in fact present only in those cells of Bowman's capsule which are thickening to form the first part of the proximal tubule.

Dr. Nicholson has shown that sulphate is handled by the renal tubule in a manner similar to phosphate, being reabsorbed in the proximal tubule and actively excreted in the distal tubule. He has also demonstrated that citrate is not excreted by the dog's kidney and that it is reabsorbed by both proximal and distal tubules. Dr. Nicholson has also investigated the value of the "stop-flow" technique for characterizing the action of the parathyroid hormone in increasing renal phosphate excretion. He has shown that the technique itself inhibits phosphate reabsorption and has obtained further evidence confirming the theory that parathyroid hormone stimulates phosphate secretion by the distal tubule.

Reported by Professor A. G. Gornall

In the Fellows Laboratory Dr. Velta Cernavskis has applied immunochemical techniques to the study of protein binding of steroids. Mr. D. Ostrovsky is investigating the interrelationship of renal and adrenal factors in the etiology of hypertension.

Dr. S. Cohen has continued his studies of methods of hydrolysing and extracting the urinary conjugates of steroid metabolites.

In collaboration with Dr. H. Basian of the Department of Surgery a study of aldosterone secretion in renal hypertensive dogs has been initiated.

Mrs. V. Reinholds has found that vasopressin has no effect on the blood pressure of rats given aldosterone or desoxycorticosterone. Miss D. Mueller has shown that stress in the form of mild electroshock does not enhance the effects of these two hormones. Mr. B. Grajman has studied the effects of aldosterone and of progesterone on skeletal muscle electrolytes.

In the Steroid Hormone Laboratory the microchemical estimation of aldosterone and tetrahydroaldosterone in urine from patients and from dogs has been carried out by Mrs. C. Gwilliam, Mrs. V. Barcza and Mrs. M. L. Schönbaum. Mrs. M. Kandel has been responsible for isotope measurements and the estimation of aldosterone secretion rates.

In the Clinical Investigation Laboratory Mrs. H. Pavuls has carried out ketosteroid, corticoid, and other analyses as required.

The following problems have been under study during the year in collaboration with the clinical departments:

(1) The use of aldosterone antagonists and other drugs in the treatment of cirrhosis with ascites and edema, with Dr. J. A. Dauphinee, Department of Medicine, and Dr. A. Kahn, Sunnybrook Hospital D.V.A.

(2) Factors affecting the secretion, biological action, metabolism, and excretion of aldosterone, with Dr. J. C. Laidlaw, Dr. J. L. Ruse and Dr. D. Killinger, Department of Medicine.

(3) Aldosterone excretion and secretion in various disease conditions, with clinicians of several departments.

Reported by Dr. William Paul

The biophysical laboratory is engaged in research which may be divided into two rather different fields: photometric determination of the oxygen content of blood and measurement of radioactivity with particular reference to the diagnostic applications of radioactive isotopes.

Dr. R. W. Gunton, Department of Medicine, has been using oximeters developed some years ago by this laboratory in dye dilution measurements in cardiac investigation while Dr. C. R. Woolf (Department of Medicine) has been using a similar instrument in cardiac pulmonary studies. However, this past year has seen the resumption of instrument research in an attempt to devise suitable techniques for measuring the oxygen content of blood flowing through the isolated perfused kidney preparations which are being studied by Dr. W. K. Kerr and Dr. J. F. D'Aloisio of the Department of Surgery.

With the assistance of a grant from the Ontario Cancer Treatment and Research Foundation the study of external localization of brain tumours has continued with the collaboration of the staff in Neurosurgery. The evaluation study of Arsenic-74 as a tracer has been completed and has been accepted for publication in the *Journal of Nuclear Medicine*. Instrumentation changes have now been made to permit evaluation and comparison of other tracer substances, notably radioiodinated human serum albumin. This investigation is now under way.

The laboratory facilities for dispensing and measurement of radioactive isotopes are used, as in the past, by other departments of the Faculty of Medicine in their own research projects with varying degrees of collaboration by the staff of the biophysical laboratory.

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PATHOLOGY

Under the direction of Professor J. D. Hamilton

There were no changes in the undergraduate teaching programme that has now been in operation for several years. The staff, however, is not completely satisfied with the division of time between lectures, laboratory periods, and group teaching. With the reduction in the total number of lectures, there is a tendency on the part of the individual lecturer to include too much material in the time at his disposal. On the other hand, the students are inclined to place too much reliance on the lecture and not enough on textbooks. It is questionable if the individual student makes the optimum use of the laboratory periods at his disposal for the study of microscopic sections and gross material.

The lack of a formal examination in Pathology at the end of the third medical year is considered to be the cause of a slackening of interest that is evident during the last quarter of the year. Despite this and some difference of opinion about the kind of material that should be presented to the third medical year during the seminars, the staff is unwilling to modify the programme at this time, considering that it is basically sound but requires definition as to content.

During the past year lecture courses have been given in advanced Pathology to those students registered in the Graduate School. The staff also participated in a series of lectures given to career pathologists under the Division of Postgraduate Medical Education. These two courses have increased markedly the teaching load of the Department.

Space is now at a premium and lack of it is beginning to hamper the normal development of the research programmes. In addition remodelling of the existing rooms, in order to make maximum use of the space that is available, is not keeping pace with the requirements of the Department. During the past year the Lister Library has been consolidated with that of the Departments of Pathology and Bacteriology. While this has made more space available for the Department of Medicine, it has reduced the existing space of the Department of Pathology. None the less, the improved facilities and content of the Library will greatly benefit all the departments housed in the Banting Institute.

Professor Hamilton addressed the Ottawa Academy of Medicine, and was Visiting Professor to the University of Ottawa. Professor Movat took part in the Ciba Foundation Symposium on Renal Biopsy in London, England, and followed this by a tour of various laboratories in England, France, Germany, and Sweden where he studied methods and techniques in electron microscopy.

It is with regret that the departure of Professor Shea is recorded. During the two years that he has been a member of the staff of this Department he has contributed notably to the teaching programme and to research, and we wish him every success in his new appointment to the staff of the Department of Pathology of Harvard Medical School.

During the past ten years there have been many changes in the Department. The amount of teaching has almost doubled through the addition of courses for students in Dentistry, Physical and Occupational Therapy, graduate students proceeding to a higher degree, and graduates training in Pathology. The research

programme has expanded tremendously, and has justifiably earned wide recognition. All of these activities have involved more effort, often under difficult conditions, on the part of the whole staff of the Department. I wish to take this opportunity of paying tribute to all those members of the staff whose loyalty and co-operation have made possible the present development of the Department.

Research

The use of the electron microscope in an increasing number of research projects has reached the point that one instrument is no longer sufficient to meet the demand. It was installed in the Department of Pathology with the aid of a Public Health grant and on the understanding that it would be available to all the departments in the Banting Institute. In the Department of Pathology alone, there are now six projects in which electron microscopy is the principal technique employed. In the Department of Otolaryngology Dr. Farkashidy is continuing his project, and in the Department of Medicine three separate investigations in which biopsies of thyroid, small bowel, and kidney need to be examined with the electron miscroscope, are continuing. The machine is now in use from early morning until late at night including Saturdays and Sundays, and with the heavy demands upon it is breaking down more frequently. Fortunately, the addition of an electronics technician to the staff has resulted in much less loss of time through breakdowns.

Research has been facilitated this year through the remodelling of a room for fluorescent microscopy and an associated dark-room. This technique too is becoming used more frequently in various investigations.

Dr. Movat in co-operation with Dr. D. Huhn and Dr. J. W. Steiner has studied the fine structural alterations in acute glomerulonephritis and experimental glomerular lesions, produced by injection of antigen-antibody complexes. Studies on progression of nephrotoxic nephritis of dogs to chronic glomerulonephritis are continuing.

Dr. N. V. P. Fernando under Dr. Movat's direction is continuing his studies on the fine structure of connective tissue. This includes investigation of the terminal vascular bed and will be the base line for a study of vascular changes in inflammation.

Dr. Stephen M. Shea continued his research into the operational analysis of light microscopic morphology. This has led to the development of specifications for a comparisons microscope. A microscope meeting these specifications has been developed by the American Optical Company, and was constructed with the support of the National Cancer Institute of Canada. The application of the method of paired comparisons to the quantitative, non-parametric ranking of histological patterns has been supplemented by the development of the theory to include the case of histological classification. The use of the elaborated theory and of the comparisons microscope in tumour taxonomy is continuing.

Dr. J. W. Steiner and Dr. J. S. Carruthers continued their studies of the fine structure of the liver with emphasis on elucidating the appearance of the components of the intra-hepatic biliary tree by means of the electron microscope. Mechanisms of immunologic tissue injury were studied by means of antigen-antibody complexes in the liver and in the skin of experimental animals.

With the assistance of Mr. R. Baumal experiments have been initiated to investigate at the ultra-structural level the effects of heterologous anti-liver antibodies. Human material from cases of both extra- and intra-hepatic biliary obstruction was examined in the electron microscope.

Dr. Steiner has co-operated with the investigations in the Department of Medicine on diseases of the thyroid and diseases of the small bowel in examining biopsy material by means of the electron microscope.

Professor Barrie has continued his studies of renal disease.

Dr. W. Anderson is continuing his investigation of the blood-stream dissemination of malignant cells.

Dr. D. W. Thompson is continuing his work on an atlas of gynaecological and obstetrical pathology as well as pursuing his study of cytological changes in the female genital tract.

Dr. R. J. MacKay is continuing to collaborate with Professor A. M. Fisher of the School of Hygiene on experimental pneumoconiosis and lung tumors.

Dr. Calvin Ezrin has continued his study of the cytology of the pituitary gland and correlation of cytological changes with various clinical states. As noted elsewhere, Dr. Ezrin was awarded the Ortho Prize by the Canadian Society for the Study of Fertility for this work.

DIVISION OF NEUROPATHOLOGY

Reported by Professor J. Olszewski

The general plan of undergraduate teaching was the same as in the previous years. We welcomed the decision of the departments of Anatomy and Physiology to integrate the courses of Neuroanatomy and Neurophysiology and to move them into the second year. It is hoped that a better background will be provided for teaching neuropathology. The results of the examinations were better in this than in the previous year but it is likely that the questions were slightly easier. We are aware that the present course of neuropathology is far from adequate, and that no substantial improvements were introduced last year. The main needs are enlargement of student sets of neuropathological slides, replacement of old museum specimens, and—together with the Department of Pathology—reorganization of the examination system. We must also consider introduction of better visual aids for lecturing, as, for instance, film strips on pathological dissections.

Several very important changes in the organization of the Division of Neuropathology have occurred during the past year.

(*a*) The main change was the gradual assuming by the Toronto General Hospital of the financial responsibility for autopsy and surgical routine services. The technical staff was enlarged and the University technicians became available for help in preparation of teaching material and in research projects. In addition, urgently needed equipment was purchased by the hospital. We are looking forward to the appointment next year of a neuropathologist to the Toronto General Hospital. This will take the main burden of routine studies from the shoulders of Professor M. I. Tom and allow her to devote more time to special cases and postgraduate teaching. Thus her immense experience will be put to a more profitable use.

(*b*) An active research programme has been started, the details of which are described below under a separate heading. It suffices to say here that five experimental projects have been under investigation and that several clinico-pathological case reports have been prepared for publication or presentation at scientific meetings. We acknowledge with thanks the financial support of the Medical Research Council, the Multiple Sclerosis Society of Canada, the Atkinson Charitable Foundation and the Paraplegic Association of Canada, which allowed us to pursue this work.

(*c*) The postgraduate training in Neuropathology was significantly broadened. Three Fellows—two in training in Neurology and one in neurosurgery—spent one year in the Division. By their enthusiasm, initiative, hard work, and thorough knowledge of clinical subjects Dr. H. Hoffman, Dr. D. McGee, and Dr. R. McPhedran established a standard of excellence which will be hard to surpass in future years. The formal teaching functions consisted of a course on histological neuropathology given by Professor M. I. Tom, of weekly clinico-pathological conferences attended by the clinical staff, of a series of neuroanatomical demonstrations arranged by Professor J. Olszewski and of a Seminar at which Fellows presented essays on various neuropathological topics. In addition, the bimonthly meetings of the Journal Club provided not only a forum for stimulating exchange of scientific ideas but also for a pleasant social gathering. Professor J. Olszewski lectured at the postgraduate special course at the Toronto General Hospital and at the postgraduate seminar in general patho-

logy of the School of Postgraduate Studies and Research. Dr. N. B. Rewcastle gave a series of lectures to the Staff of the Department of Ophthalmology and Dr. H. Hoffman, Dr. D. McGee, and Dr. R. McPhedran lectured to the course in Physical and Occupational Therapy. On the invitation of the Eastern Division of Electro-encephalographers, Professor J. Olszewski delivered the J. Kershman Memorial Lecture on "Changing Aspects of Neuropathology," at the annual meeting of this Society in New York City, and on the invitation of the Canadian Association of Anatomists a lecture on "Modern Trends and Requirements in the Study of the Brain" at the Federation Meetings in Guelph. Dr. N. B. Rewcastle addressed the Toronto Chapter of the Multiple Sclerosis Society of Canada on "Research in Multiple Sclerosis."

(*d*) A very welcome development was the initiation of a special laboratory for the study of muscle diseases under the direction of Dr. Humphrey, who returned to Toronto last year, after extensive post-graduate work in Europe and the United States. His special interest in, and knowledge of, muscle pathology will be a great asset to our Division. His work is supported by a grant from the Muscular Dystrophy Society of Canada, and his appointment is a joint one with the Department of Medicine.

(*e*) We are also very pleased to welcome Dr. C. Ezrin and his laboratory for special studies of the hypothysis to our Division. Dr. Ezrin's work, supported by a grant from the Medical Research Council, will add an important field of interest to the scope of our investigations.

(*f*) Of paramount importance for the future of our Division was the magnificent gift of one million dollars received by the University for research in the field of neurological disciplines. It is hoped that this will provide a platform for a closer co-operation of laboratories devoted to the study of the nervous system, now scattered among various departments of the University.

The Division was visited by Professor L. Rubinstein from the London Hospital, England, who delivered a lecture on "The Spread of Tumours in the Central Nervous System," and by Professor J. Austin from Portland, Oregon, who visited the Division and talked informally on leucodystrophies.

Members of the Division took part in various scientific meetings, presented papers, and participated in discussions. Of particular interest was the meeting of the newly organized Canadian Association of Neuropathologists held in Montreal on June 14. At present it is a rather informal organization but steps are being taken to formulate a Constitution and obtain a Charter.

Professor M. I. Tom was elected Chairman of the Section of Neurological Sciences of the Toronto Academy of Medicine and Professor J. Olszewski was elected to the Council of the Canadian Neurological Society.

Dr. P. Lampert accepted a one-year appointment at the Armed Forces Institute of Pathology in Washington, and left our Division on April 30. We feel confident that one year spent with Dr. W. Haymaker will be of great value for his future, and we are looking forward to his return to us next year.

One can state with pleasure that in general the Division had a very successful year: the work in the Division was progressing, developing, and expanding; the co-operation with the Department of Pathology, with the Neurological and Neuro-surgical divisions of the Toronto General Hospital, and with the Laboratory of Neurophysiology of the Best Institute was intimate and mutually profitable; and the staff worked with devotion and understanding which were exemplary. However, it would be unwise not to recognize short-comings which are with us or which will be increasing as time progresses. The need for thorough remodelling and renovation of most of the rooms occupied by the Division is acute. If done, not only will the present personnel be able to work more efficiently, but more space will become available. The sharing of the facilities of the electron microscope with several other departments is hampering seriously the progress of electron microscopical studies conducted by Dr. N. B. Rewcastle. The acquisition of an electron microscope for the Division is an important capital improvement which has to be achieved soon. The

Division is in urgent need of more space for laboratories and offices. The present overcrowding makes the work difficult and less efficient. Further effort should be made to speed up finishing of autopsy cases—with more efficient methods the routine cases could be finished within two to three weeks after the autopsy. The financial situation of the Division, though considerably improved, is far from satisfactory. If high standards of service to the Hospital and the proper teaching level for postgraduate students are to be maintained, the Division needs three assistant residents. At present, funds are available for one only, and to secure the moneys needed for the two others requires energy, effort, and time which should have been spent on other, more academic activities. In view of the importance of training in neuropathology for neurologists and neurosurgeons, it is hoped that funds will be provided by the Toronto General Hospital to have three assistant residents in Neuropathology—one from Pathology, one from Neurology, and one from Neurosurgery.

Research

Professor M. I. Tom, in collaboration with Dr. Lougheed, Department of Neurosurgery, finished the first stage of the investigation of the effect of subarachnoid bleedings in dogs. The results have been published.

Professor M. I. Tom and Dr. P. Lampert, in co-operation with Dr. J. Cumings of the National Hospital, Queen Square, investigated by histochemical methods a case of Whipple's Disease with predominantly neurological manifestations.

Professor J. Olszewski and Dr. D. McGee, in co-operation with Dr. T. Van Patter and Dr. J. Marotta from St. Michael's Hospital, studied two cases of superficial cerebral siderosis, a very rare condition developing in cases of prolonged subarachnoid haemorrhages.

Dr. D. McGee, Dr. R. McPhedran, and Dr. H. Hoffman studied the large vessels of the neck on unselected autopsy material. In 70 cases, carotid and vertebral arteries were removed and investigated. Their condition was correlated with the clinical history, systemic arteriosclerosis, state of cerebral arteries and the presence of cerebral lesions. The main result of this work is the evidence that brain lesions are more prone to develop if additional factors, such as arteriosclerosis of small cerebral arteries, are present in addition to occlusive disease of the arteries of the neck.

Dr. J. Humphrey is undertaking the histological examination of muscle biopsies to delineate further the aetiologies and pathological changes of the acquired myopathies of late onset. He will also study histology of the intra-muscular nerve endings and end plates by vital and cholinesterase stains from biopsies of patients with neuromuscular disorders. It is also planned to initiate studies of the histochemical staining of normal and diseased peripheral nerve and muscles.

Dr. H. Hoffman and Professor J. Olszewski studied the distribution of fluorescent dyes and iodinated albumin in the brain tissue adjacent to the tuber cinereum and area postrema. They have shown that there is a fast and intense spread of these substances in the normal brain tissue. This indicates that the phenomenon of the blood-brain barrier is not caused by the absence of extracellular space in the central nervous system.

Dr. Lampert investigated several aspects of the pathogenesis of allergic experimental encephalomyelitis.

Dr. Rewcastle started the investigation of the nervous system using the electron microscope and now has the basic technique well in hand. After the initial stage of familiarizing himself with the new approach, he is now beginning to study the vascular changes in brain wounds. In addition, thanks to the full co-operation of the Department of Neurosurgery, he began to study with electron microscope the surgical human material. Also, in co-operation with Dr. Humphrey's laboratory of muscle pathology, he is obtaining muscle biopsies for investigation with this new technique.

Dr. Rewcastle and Professor Olszewski studied neuronal changes in the inferior olive after lesions at various levels of the brain stem in the cat. The lesions were placed with the help of a stereotaxic instrument and, after a survival period of

several months, the brain stems were investigated histologically. The aim of this study is to reproduce experimentally the hypertrophic degeneration of the inferior olive. Lesions placed in the pons did not produce any changes in the olivary complex. This study is being continued.

Mr. H. Wiebe, a medical student on summer fellowship from the University of Saskatchewan, studied the neuronal changes in the anterior horn cells of amputees. The results of this study formed a starting point for an experimental investigation which will be carried on next year.

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PHARMACOLOGY

Under the direction of Professor E. A. Sellers

In common with other basic science departments of the Faculty of Medicine, the Department of Pharmacology has teaching responsibility for more non-medical

than medical students. The number of students in Dentistry (second year) and in Pharmacy (fourth year) has been progressively increasing.

For many years the number of students in the second year of the Medical course has necessitated duplicating laboratory classes on different days. The increase in the number of dental students will make a similar duplication necessary in the next and subsequent sessions. It is possible that a division of Pharmacy classes may also be required.

The number of lectures offered to second year Dentistry has been doubled, making it possible to cover the subject in a more satisfactory manner. The effect of large numbers of students and duplication of classes on a close, personal relationship between teacher and individual student is easily imagined. Fostering the legitimate interests of the separate faculties we serve (Medicine, Dentistry, Pharmacy, Graduate Studies, Arts and Science) makes realization of our objectives in teaching a complex matter.

A partial solution to these problems of teaching has been the use of senior scientists and graduate students paid from non-University sources as instructors. The teaching function of this department is dependent on personnel not supported from University funds. It is well to recognize that teaching at all levels is heavily subsidized by agencies primarily devoted to support of research.

The gradual renovation of the department is continuing. The beneficial effects of new equipment and modern laboratories on undergraduate and graduate teaching, and on our research programme is impressive. Without any increase in space larger undergraduate classes and more graduate students have been accommodated. While a quantitative effect has occurred, the qualitative effect is of greater importance. This increase in activity has resulted in taxing available facilities—storage space, chemical stockroom, locker space, library space, washing facilities, are limited or lacking.

The Department is again indebted to members of the Department of National Health and Welfare, the Department of Health (Ontario), the Laboratory of the Attorney General, and the Defence Research Medical Laboratories for active participation in laboratory and Seminar classes.

Graduate students have completed the following theses:

For the M.A. degree:
Leong, Basil Kwan-Jun. The responses of sensitized animals to sulphur dioxide.

For the Ph.D. degree:
Johnson, Gordon E. Drug action on thermoregulation.

Research

In Professor E. A. Sellers' section, and in collaboration with the Department of Therapeutics, Dr. W. J. Russell Taylor has obtained promising results treating emphysematous patients in acute respiratory depression with drugs which stimulate the respiratory centres rather than with intermittent positive pressure breathing. In selected cases, treatment with appropriate drugs appears to be at least as good as intermittent positive pressure respiration. The drug regimen has the advantage of being applicable at any medical centre, regardless of the availability of specialized respiratory equipment. It is proposed to extend this project in "clinical pharmacology" in the coming year, jointly with the Department of Therapeutics.

Dr. R. O. Davies has continued experiments on the effects of drugs on the hypothermic heart. Reserpine and other drugs have a definite effect on the temperature at which spontaneous cardiac action ceases. Mr. Basil Leong worked in the Industrial Toxicology Laboratories of the Department of National Health and Welfare during the summer months. He has been investigating the effects of exposing various species of animals to sulphur dioxide gas, after the resistance of the animals has been altered

by pretreatment with histamine or substances liberating histamine *in vivo*. It has been observed that persons suffering from cardio-respiratory disease are most severely affected during episodes of acute "smog," and the object of our study has been to simulate this situation experimentally. Dr. H. N. McFarland (Department of National Health and Welfare) and Professor Sellers supervised these experiments.

Professor Sellers and Professor E. Schönbaum are studying the goitrogenic effect of thyroid hormones, which has been described previously. Because this effect is anomalous, and contrary to present concepts of thyroid function and control, the investigation is concerned with these fundamental factors. A method is being developed, by Mrs. M. L. Schönbaum, for the assay of thyrotrophic hormone. The explanation of the growth of dependent tumours, and the cause of hyperthyroidism will eventually be reached by acquiring such knowledge. Our approach is original and promising.

The biochemical mechanisms of adaptation to cold are being studied by Professor E. Schönbaum. Mrs. A. Rimmer initiated a study of the effect of norepinephrine on blood glucose and free fatty acids of warm and cold-adapted animals. This series of experiments will be extended using other drugs. With Dr. G. E. Johnson and Professor Sellers, the effects of norepinephrine and other drugs on the maintenance of body temperature during exposure to cold are being investigated. Miss M. Metski has set up enzymatic methods for the estimation of carbohydrate metabolites and is applying these techniques to the study of the metabolic basis of homeothermia. Professor Schönbaum is collaborating with Dr. W. G. Bigelow of the Department of Surgery in his studies of hibernation.

Under the direction of Professor G. H. W. Lucas, Dr. C. Korczak has continued a study of tranquillizing drugs. A satisfactory colourimetric method for differentiating phenothiazines from other tranquillizers, has been developed. This method may be applied directly to powder from pills, tablets, or capsules, or it may be used to detect drugs in solution. With Mr. L. Cass, a method was developed to estimate the absorption of codeine when ingested in ordinary tablet or capsule form or in a slow-release tablet; measurements were made on the blood and urine of animals receiving medication. With Mr. T. J. Holmes, a rapid and satisfactory method was devised to recover and estimate quantitatively procaine and other local anaesthetics from biological material. This study was essential in a research project undertaken in the Department to find a satisfactory method of treating local anaesthetic poisoning.

Research under the direction of Professor W. Kalow has been conducted in four different fields. (1) Mr. D. Ecobichon separated human liver esterases by electrophoresis on starch gel and tested properties of the isolated enzymes, and found that none of the liver esterases was identical with any of the serum esterases although the latter are supposed to be formed in the liver. Studies on foetal and infant livers have shown that esterases seen in the adult appear at different times during development. An investigation of the cholinesterase of human erythrocytes in cases of paroxysmal nocturnal hemoglobinuria showed the enzyme activity to be low, but the data suggest that the enzyme has normal properties. With Dr. D. Fraser (Hospital for Sick Children) a collaborative study has been undertaken on the properties of alkaline phosphatase in cases of hereditary hypophosphatasia; and with Dr. D. Gunn (Ontario Hospital, New Toronto) the investigation of atypical cholinesterase was continued. Dr. A. Marton, with the assistance of Dr. W. Mettner, investigated the toxicity of insecticides with anticholinesterase properties. Malathion (considered to be relatively non-toxic to mammals) when fed to rats for long periods during which they were allowed to breed, was found to impair the growth and development of the offspring. Animals receiving Malathion, although appearing normal, succumbed easily to cold. (2) A series of studies were concerned with the cause of mental retardation in phenylketonuric children. The question was raised whether the known disorder of amino acid metabolism affects the formation of biologically active catecholamines. In collaboration with Dr. M. Partington and Dr. A. Conn (Hospital for Sick Children), the response of phenylketonuric subjects to injected epinephrine and tyramine

was assessed before and after dietary treatment. The data obtained suggest that the treatment improves the functional state of the sympathetic system. Corroborative evidence was obtained by biochemical tests for epinephrine, norepinephrine, and dopamine in the urine of phenylketonuric and control subjects. (3) Mr. T. Konop continued his studies on the nature and the pharmacological properties of a substance which occurs in human serum and which inhibits the response of frog muscle to acetylcholine. (4) In a collaborative study with Dr. A. E. Dyer (Connaught Medical Research Laboratories) it has been found that there is a substantial variation from person to person in the extent to which penicillin is bound to plasma proteins. Additional variation is due to penicillin destruction in some sera, possibly caused by penicillinase of bacterial origin.

Research under the direction of Professor H. Kalant has continued along the two main lines reported previously. (1) A study is being made of the role of calcium-binding substances in the wall of the normal liver cell, and of the differences between normal and malignant cells with respect to these substances. Electrophoretic studies made in collaboration with Dr. J. M. Murray, of the Department of Biochemistry, have indicated that removal of calcium from the normal cell causes the loss from the cell of a specific protein which, it is believed, may be involved in the calcium-binding site. Electron micrographic studies, made in collaboration with Dr. T. S. Leeson, of the Department of Anatomy, have confirmed clearly the role of calcium in binding normal liver cells together. Both these studies are now being repeated with liver tumours induced by chemical carcinogens, in order to determine the differences between normal and malignant liver cells. In addition, the sialic acid contents of both types of cell are being studied chemically and histologically, with the able assistance of Mrs. W. Mons. (2) With the collaboration of Miss Caroline Czaja, a fruitful study has been continued on the endocrine effects of acute alcoholic intoxication. It has been shown that moderate degrees of intoxication do not cause adrenal cortical stimulation (as has been widely claimed), even when repeated daily for several months. On the other hand, even small doses of alcohol cause rapid changes of water and electrolyte distribution between the blood and tissue fluids, which are strongly suggestive of increased aldosterone secretion. This suggestion is receiving confirmation from *in vitro* adrenal incubation studies now in progress. The Department continues to maintain a mutually beneficial relationship with the Alcoholism and Drug Addiction Research Foundation of Ontario.

Publications

Czaja, C. and Kalant, H. "The Effect of Acute Alcoholic Intoxication on Adrenal Ascorbic Acid and Cholesterol in the Rat" (*Canadian Journal of Biochemistry and Physiology*, vol. 39, 1961, pp. 327–34).

Dandiya, P. C. and Sellers, E. A. "Mechanism of the Hypnosis Prolongation Action of 5-Hydroxytryptamine and Some Sympathomimetic Amines" (*Archives internationales de pharmacodynamie et de therapie*, vol. 130, 1961, pp. 32–41).

Johnson, G. E. and Sellers, E. A. "The Effect of Reserpine on the Metabolic Rate of Rats" (*Canadian Journal of Biochemistry and Physiology*, vol. 39, 1961, pp. 279–85).

Kalow, W. "Unusual Responses to Drugs in Some Hereditary Conditions" (*Canadian Anaesthetists' Society Journal*, vol. 8, 1961, pp. 43–52).

Lucas, G. H. W. "The Discovery and Pharmacology of Cyclopropane" (*Canadian Anaesthetists' Society Journal*, vol. 7, 1960, pp. 237–56).

——— "The Discovery of Cyclopropane" (*Anaesthesia and Analgesia*, vol. 40, 1961, pp. 15–27).

Marton, A. V. and Kalow, W. "Inhibitors of Aromatic Esterase of Human Serum" (*Biochemical Pharmacology*, vol. 3, 1960, pp. 149–54).

Radde, I. C. and Kalow, W. "Some Aspects of Thyroid Function in Rats After Feeding of Levomepromazine" (*Journal of Pharmacology and Experimental Therapeutics*, vol. 130, 1960, pp. 436–43).

Schönbaum, E. "Adrenocortical Function in Rats Exposed to Low Environmental Temperatures" (*Federation Proceedings*, vol. 19, 1960, pp. 86–8).

Sellers, E. A. and Baker, D. G. "Coronary Atherosclerosis in Rats Exposed to Cold" (*Canadian Medical Association Journal*, vol. 83, no. 1, 1960, pp. 6–13).

Taylor, W. J. R., Johnson, W. H. and Sellers, E. A. "Cardiovascular Changes with Vestibular Stimulation" (*Aerospace Medicine*, vol. 31, 1960, pp. 627–38).
Taylor, W. J. R., Llewellyn-Thomas, E., deCandole, C. A., Murphy, J. B. and Sellers, E. A. "The Use of Metaraminol Bitartrate to Reduce the Side Effects of Atropine" (*Canadian Medical Association Journal*, vol. 82, no. 23, June 4, 1960, pp. 1147–51).

PHYSIOLOGY

Under the direction of Professor Charles H. Best

The teaching programme of the Department keeps all the available facilities occupied for five full days each week. It is hoped that our large lecture room will be available again at the end of September when the addition is due for completion. Senior demonstrators from the Banting and Best Department of Medical Research in co-operation with our own staff continue to provide a very high level of individual instruction to students.

During the 1960 to 1961 session there were six meetings of the University of Toronto Physiological Society, at which papers were presented by scientists from Australia, Russia, and the United Kingdom. Professor Charles H. Best described matters of both scientific and general interest arising from his recent travels in Europe and Israel. Dr. S. M. Shay described methods of measuring cellular alterations, and demonstrated a new microscope for simultaneous comparisons of two fields.

Members of the staff have given the following addresses:

Dr. R. G. Black, to the final electrical engineering year, University of Toronto on "The Ear as a Biological Transducer." Professor J. Campbell, addressed the graduate students at the University of Western Ontario on "The Adreno-hypophysis in Metabolism." Professor R. E. Haist delivered a lecture at the University of Western Ontario on "The Endocrine Pancreas." Dr. H. R. Hausler addressed the meeting of the Association for Research in Ophthalmology (East Central Section), Columbus, Ohio, on "The Problem of Inducing Diabetic Retinopathy in Experimental Animals."

Professor G. Hetenyi, Jr., spoke to the Third Annual Meeting of the Canadian Federation of Biological Societies on "Effect of Insulin on the Apparent Distribution Volume and Transfer Rates of Glucose"; with Dr. G. A. Wrenshall, he addressed the Fifth Annual Meeting of the Biophysical Society, St. Louis, Missouri on "Successive Primed Increments in Tracer Infusion Rate *versus* Successive Tracer Injections Used to Check the Validity of Calculated Transfer Rates in *intact* Systems"; he gave a lecture to the Physiological Journal Club, University of Tennessee, Memphis, on "The Effect of Insulin on the Distribution and Rates of Transfer of Glucose in Normal and Depancreatized Dogs." Professor F. C. Monkhouse, at the Ninth Annual Symposium on Blood, Wayne State University, Detroit, Michigan, spoke on "Studies on Clearing Factor Lipase" and the Symposium on Anticoagulants and Fibrinolysins, Toronto, on "Anticoagulant Activity of Circulating Blood." Professor A. M. Rappaport, at the Symposium on Present and Future Research in Shock and Plasma Expanders, held at the Guild Inn, Scarborough, Ont., spoke on "Liver and Shock. The Effect of Autoperfusion of Vital Organs in the Prevention of Irreversible Shock"; and at the Microcirculatory Conference, Chicago, Ill., on "Cannulation of Minute Mesenteric Veins for Continuous Portal Perfusion of Rats Intoxicated with Bromobenzene."

Professor J. W. Scott, at the Institute of Aviation Medicine, Toronto, gave a series of five lectures on "Neurophysiology Applied to Aviation Medicine": (*a*) Central control of respiration; (*b*) Central control of the cardiovascular system; (*c*) Reflex activity; (*d*) Central integrating mechanisms; and (*e*) The hypothalamus. Dr. T. M. Sibay, at the meeting of the Association for Research in Ophthalmology (East Central Section), Columbus, Ohio, spoke on "Problems of Staining Retinal Blood Vessels in Flat Preparations." Professor O. Sirek, Dr. A. Sirek, and Dr. B. Leibel presented a paper at the Annual Meeting of the American Diabetes

Association and before the Canadian Society for Clinical Chemistry on "Serum Glycoproteins in New-born Infants of Diabetic Mothers."

Graduate students have completed the following theses:

For the M.A. degree:

FORBATH, N. F. Factors influencing the carbohydrate metabolism of muscle.

RUEDY, MISS S. C. Studies concerning some metabolic effects of glucagon.

For the Ph.D. degree:

HETENYI, G. J. The measurement of the accumulation and transfer rates of glucose in the intact dog. The effect of insulin.

MONEY, K. E. Functions of the separate sensory receptors of the non-auditory labyrinth of the cat.

RESEARCH

In Dr. J. Campbell's section, studies on diabetes have been continued. With Mrs. V. Lazdins, progress has been made in the production of diabetes by growth hormone in the normally-fed rat, a species so far resistant. The effects of the administration of growth hormone on the amount of insulin extractable from pancreas that has been incubated *in vitro* was studied with Dr. G. A. Wrenshall and Mr. I. Lipton. A metachromatic colour reaction of a dye with the A chain of insulin has been studied. The results may be applicable to the determination of insulin. With Dr. A. Martucci and Mr. G. R. Green, factors influencing the production of non-esterified fatty acids by rat epididymal fat tissue *in vitro* have been investigated. Choline-deficiency in the rat did not alter the rate of production by the tissue, nor did choline added to the medium. By means of a procedure developed in this laboratory, the activities of substances that promote the production of fatty acids by adipose tissue *in vitro* have been measured. These include pituitary hormones and blood serum from fasting subjects.

Dr. H. R. Hausler, Dr. T. M. Sibay, and Miss B. M. S. Stachowska have continued work on diseases of the eye in diabetes mellitus. This research unit is operated jointly with the Department of Ophthalmology, and supported by a National Health Grant. The induction in experimental animals of retinopathy comparable to that occurring in man has been studied, and techniques for the examination of retinae have been developed. A new concept for the origin of the microaneurisms in diabetic retinopathy has been presented. Dr. Hausler, Dr. J. McDonald, and Dr. V. C. C. Alexander were engaged in clinical studies of eye complications in diabetic patients at the Toronto General and the Toronto Western hospitals.

In Dr. D. W. Clarke's section, Miss C. A. Miller has continued her studies on factors affecting the glucose uptake of the epididymal fat pad. Hypophysectomy of the animal results in a decreased uptake by this tissue, but no increase in sensitivity to insulin. Adrenalectomy, or treatment with cortisone does not alter the basal glucose uptake, but the response to added insulin is greater after the former treatment and is reduced by the latter treatment. Mrs. E. Vertes has started work on measuring the effect of alcohol on the incorporation of phosphate into different metabolites in cerebral tissues. A calorimeter suitable for the measurement of the small amounts of heat produced in isolated tissues has been constructed as part of a programme to investigate the relationship between heat production and carbohydrate metabolism.

In Professor R. E. Haist's section, studies have continued on the islets of Langerhans, the regulation of blood sugar level, hypothermia, and shock secondary to injury. With Miss G. V. Kovacs, a study of factors influencing the circulation in living islet tissue is in progress. With Dr. Rosemary D. Hawkins, an investigation was made of the influence of insulin pretreatment severe enough to reduce islet activity, on certain effects of tolbutamide. With Miss A. L. Haxton, Miss A. L. Haag, and Dr. M. A. Ashworth, the effect of hypothermia on the responses to certain hormones and the responsiveness of endocrine glands has been followed. Some studies on renal function in shock secondary to injury are being made also.

Dr. W. J. Linghorne is continuing his investigation of the mechanism of osteo-

genesis in repair and the requirements that must be present for an osteogenic rather than a fibrous repair. The results indicate that undifferentiated osteogenic cells from bone may differentiate to osteoblasts, chondroblasts, or fibroblasts. Factors in the environment of the proliferating cells appear to determine the pathway of differentiation. The three types of differentiation may occur in the healing of a fracture.

Professor Markowitz, in conjunction with the group at the Ontario Veterinary College has continued his studies on the experimental surgery of the liver. Some very interesting observations have been made on the visceral organism, with Professor H. Downie and Dr. D. Secord.

Professor F. C. Monkhouse, with Mrs. Jean Strachan and Miss Pamela Way, has continued to study clearing factor lipase (CFL) of postheparin plasma. CFL was partially purified by adsorption on tricalcium phosphate and elution with citrate. Changes in postheparin CFL after whole body irradiation, fasting and following dietary changes are being measured. Changes in rat skin following hypophysectomy, daily injections of cortisone, protamine, heparin, and histamine have been measured. Comparisons are being made between changes in plasma CFL and changes in tissue heparin. Mrs. Susan Milojevic, with Professor Monkhouse, is investigating the anticoagulant activity of blood *in vivo*. Changes in thrombin generation, antithrombin, and fibrinogen have been measured following the slow infusion of thrombin and thromboplastin into dogs, rabbits, and rats. Dr. D. R. Hopkins is undertaking a study of the role of plasminogen (profibrinolysin) activators in the prevention and treatment of venous and arterial thrombosis.

In Professor A. M. Rappaport's section, research is continued on the rate of detoxication of ammonium salts in the dog and the change they produce in hepatic blood flow. The ammonium salt solutions are infused through various routes into the liver. For estimation of hepatic blood flow a special catheter has been devised. It permits obtaining a mixed blood sample from all hepatic veins at once via the inferior vena cava. This catheter has been used for the retrograde injection of radio-opaque substances into the hepatic veins. In a joint research with Dr. R. B. Holmes and Dr. H. Stolberg of the Department of Radiology radio-cinematographic recordings have been obtained of the entire hepatic venous tree and its branches up to their sixth order in dogs. The technique of cannulating tiny mesenteric veins without visual control has been perfected. Thus Dr. M. Kaneko from Japan was able to infuse continuously for three weeks a non-inebriating dose of alcohol into the portal system. He is studying the effect of alcohol on the liver of rats on a choline-deficient diet and of controls on a choline-supplemented regimen.

Dr. J. Kohari and Dr. Rappaport assisted by John Ireton have made slow progress in the attempts to transplant in dogs a pediculated auricular flap onto the mitral valve. Dr. G. Hetenyi, Jr., Dr. Rappaport, and Dr. G. A. Wrenshall in joint research have tested the validity of calculations in successive tracer injections and the effects of insulin on glucose production and distribution in hepatectomized dogs. The technique of hepatectomy was perfected so that blood loss during and after the operation was prevented.

In Dr. J. W. Scott's section Mr. Kenneth E. Money has completed his work on the vestibular apparatus of the cat and submitted a thesis for a Ph.D. degree to the School of Graduate Studies. He has shown that the semi-circular canals are equally sensitive to clockwise and counterclockwise rotation in their own plane. Dr. R. G. Black has joined the section on a full-time basis. He is undertaking a study of the spinal nucleus of the trigeminal nerve of the cat. Dr. Hugh Barr has been studying during the past year the action potentials of the smooth muscle of the urinary bladder wall.

Dr. O. Sirek in collaboration with Dr. A. Sirek have continued their studies on the composition of the carbohydrate moiety of serum proteins in infants born to diabetic mothers. A definite increase in the amount of protein-bound carbohydrate occurring in infants of diabetic mothers appears to be now established. The significance of serum glycoproteins in foetal growth and development is being further investigated in experimental animals.

Publications

Campbell, J., Green, G. R., Schönbaum, E. and Socol, H. "Effects of Exposure to Cold on Coenzyme A Levels in Liver Tissue" (*Federation Proceedings*, vol. 19, supp. 5, Dec., 1960, pp. 124–5).

Clarke, D. W. and Forbath, N. "The Effects of Phenformin on the Isolated Rat Diaphragm" (*Diabetes*, vol. 9, May, 1960, pp. 167–9).

Hetenyi, G. and Wrenshall, G. A. "Abrupt and Delayed Effects of Insulin on the Distribution Space of Glucose in the Dog" (*Nature*, vol. 186, June, 1960, pp. 808–9).

Hetenyi, G., Rappaport, A. M. and Wrenshall, G. A. "The Validity of Rates of Glucose Appearance in the Dog Calculated by the Method of Successive Tracer Injections: I, Effects of Surgical Hepatectomy, Evisceration and Order of Tracer Injection" (*Canadian Journal of Biochemistry and Physiology*, vol. 39, Feb., 1961, pp. 225–36).

Lickley, L. and Monkhouse, F. C. "Development of Lipemia in Rats Following the Intravenous Injection of India Ink" (*Proceedings of the Society for Experimental Biology and Medicine*, vol. 103, April, 1960, pp. 777–80).

Martin, E. J. "Hypothermia and Ischemia of the Bone Marrow as Protection Against Injury by Whole-Body X-irradiation in Rats" (*Radiation Research*, vol. 12, June, 1960, pp. 705–9).

Monkhouse, F. C. and Milojevic, S. "Changes in Fibrinogen Levels after Infusion of Thrombin and Thromboplastin" (*American Journal of Physiology*, vol. 199, Dec., 1960, pp. 1165–8).

Ross, P. L. E. and Rappaport, A. M. "Cannulation of Minute Mesenteric Veins for Continuous Portal Perfusion of Rats" (*Nature*, vol. 188, Oct., 1960, p. 326).

Sirek, A., Sirek, O. V. and Hanus, Y. "Effect of Carbutamide in a Depancreatized Dog with a Small Ectopic Pancreas" (*Metabolism*, vol. 9, no. 7, July, 1960, pp. 660–5).

Stirling, R. A. C. and Campbell, J. "Metabolism in Hypophysectomized-Depancreatized Dogs" (*Metabolism*, vol. 9, Aug., 1960, pp. 738–52).

PSYCHIATRY

Under the direction of Professor A. B. Stokes

The past two or three years have seen the fruition of many ideas that have been germinating in Psychiatry over half a century. One worthy of particular attention and consideration is the opening up of hospital facilities to psychiatric patients without the imposition of legal procedures and the necessity of attested certificates.

In the early 1900's the usual public and medical attitudes towards the psychiatric patient were those of rejection and nihilistic interest. Incarceration into a segregated custody was deemed a social necessity: legal safeguards were erected to uphold the rights of people not to be admitted: admission was associated with locks and bars, guards and turnkeys.

World War I altered attitudes radically. In circumstances of universal stress, the like of which had never been previously experienced, hundreds of thousands of healthy young men broke down with grave behavioural disturbance: the antipathetic labels of "shell-shock" or "loss of moral fibre" could not disguise the magnitude of the problem nor blur the malign effects of disruptive stressor forces on personal and social adjustment. Provision had to be made for the study of personal break-down in living and for the application of hardly gained knowledge. As facilities developed it was apparent that very many mentally ill or emotionally disturbed patients *wanted* treatment: the era of the voluntary patient ensued in the 1920's and 1930's. Lunatic asylums were renamed Mental Hospitals and the spirit of the change was reflected in the services of nurses and physicians (no longer wardresses and alienists).

It must not be forgotten that the voluntary patient, wanting treatment, still had to sign himself into the Mental Hospital—help was accorded him only after he had forfeited a degree of liberty. None the less, the effect was to uncover earlier, more tractable, illness and to invigorate medical studies even if these were still carried out

in situations removed from the research laboratories and clinical services of the general hospitals. Slowly but surely more knowledge of psychiatric illness was achieved until the advent of World War II.

The second world cataclysm had some important effects on psychiatric services, particularly in Great Britain. Under the threat of bombing the great city general hospitals removed to country quarters in the mental hospitals leaving their city facilities for casualty services. In the country, and in the town casualty wards, psychiatrists mixed with other medical colleagues: a two-way interchange was facilitated in which psychiatrists both learned and taught. At the end of the war the general hospitals, back in the cities, maintained their psychiatric divisions, while in the country the mental hospitals continued to develop out-patient services and to maintain liaison with the general hospitals. As an outcome of these and other movements, the public and the medical profession accepted mental illness as part of the pattern of human suffering requiring a hospital organization to serve the need freely without undue legal restraints and deterrents. The British Mental Health Act of 1959 abolished all previous legislation connected with mental illness and mental deficiency and provided a single code applicable to all forms of mental disorder. The Act came into force in November 1960 with the over-all philosophy that psychiatric treatment will normally be obtainable *informally* in the same way that obtains for other medical and surgical conditions. The organizational implications of the philosophy are being rapidly effected. General Hospital accommodation is being provided for short-term psychiatric illness, out-patient psychiatric facilities are expanding, cross-appointments between general and mental hospitals are increasing, and, above all, educational efforts at both undergraduate and graduate levels emphatically implicate psychiatry.

The opening up of hospital facilities to psychiatric patients has also proceeded in Canada but at a slower pace and with greater reservations. Whereas the Dominion Bureau of Statistics in its annual reports records the advances that have been made in liberalizing the Mental Hospitals, in developing out-patient services, in creating psychiatric divisions of General Hospitals and so forth, legislation is still somewhat restrictive and still creates a "segregation" attitude in the public mind. Such an attitude in the public at large, particularly when it spills over into the medical profession itself or becomes part of the thinking of hospital authorities, is inimical to a university Department of Psychiatry. In Toronto great progress has been made in removing psychiatry from a position of isolation and placing it in the over-all medical picture, but much more requires to be done both from the mental hospital and from the general hospital sides. The education of young doctors to an appreciation of the emotional, personal, and social factors in illness, the development of a firm body of knowledge equal to the needs of specialist psychiatric practice, are responsibilities which require a continuous attention to an integrative collaborative network of medical services, and a recognition of the place of psychiatry in those services.

The new Psychiatric Hospital and Institute will offer a new opportunity in integration. On the one hand, it will work with the University general hospitals and on the other with the Metropolitan mental hospitals. The out-patient services (including special children and forensic clinics), the day and night hospital, the emergency services are proposed on exemplary lines: the in-patient organization will utilize appropriately well-founded psychological and social techniques alongside physical and psychopharmacological methods. Always the intention will be to devise practical economical treatment and to render it readily available to the various hospital and clinic settings. Further, it is hoped to develop collaborative research enterprises in conjunction with other university departments both medical and non-medical.

Liaison with non-medical departments is becoming increasingly important to Psychiatry. If human living is more than biological life, break-down in living requires a critical attention to psychological and sociological advances. The disciplinary necessity for a medically-based psychiatry is to maintain focus on illness and to avoid over-extension into wholesale human difficulties. The problem of what knowledge is to be applied has always confronted medicine at the level of biological process: a similar

issue now arises for psychiatry at the higher levels of human adjustment. The issue will be better faced by maintaining close contact with other campus thinking: the site of the new Psychiatric Institute adjacent to the campus will allow the benefits of cross-fertilization of ideas.

During the third world congress in Psychiatry at Montreal, Dr. C. B. Farrar, Professor Emeritus, was awarded the honorary degree of Doctor of Science by McGill University.

Over the academic year 1960–61 the undergraduate courses of instruction were further revised. More hours in the first year will allow an orderly presentation of problems of structure and function basic to the later understanding of psychiatric illness. The standard of the final examinations was good.

Graduate instruction has proceeded in accordance with last year's planning. The provision of training posts for third and fourth year graduate students has been helpful and the opportunities for a variety of concentration studies greatly enhanced. Negotiations to increase the number of training posts are being undertaken.

The number of graduate students in the Department was sixty-one. Seventeen were successful in the Diploma examination. Of past diplomates fifteen gained the specialist certificate in Psychiatry of the Royal College: three obtained the Fellowship of the Royal College by examination.

The third and fourth year graduate course in Child Psychiatry has been successfully launched: six candidates are enrolled. One member of the child psychiatric group has been awarded a Fellowship by the Atkinson Charitable Foundation for study with Piaget in Geneva.

Instruction in the field of Mental Retardation is in the process of emphatic augmentation. The Ontario Association for Retarded Children has made a very generous financial contribution towards supporting a Visiting Professor in Mental Retardation over a period of three years. The experience and knowledge of the visiting professor will be made available to medical graduates and undergraduates, to psychologists and social workers, within the University setting. The support of the Group for the Scientific Study of Mental Retardation has continued to stimulate interest in this rapidly developing field.

In June 1961, four seminars were organized by the Department of Psychiatry preparatory to the World Congress. Distinguished international authorities visited Toronto to take part in discussions on the problems of mental retardation, alcoholism, forensic psychiatry, and interpersonal relations. The proceedings were highly successful and thanks are due to those colleagues responsible for the arrangements. For three weeks after the World Congress the Department entertained a large number of visitors from overseas including delegations from the U.S.S.R. and West Germany. It was a gracious and instructive experience to explore differences in outlook and to match mutual experiences within a framework of world fraternity.

Over the year many members of the academic staff delivered lectures or contributed to seminars in other universities both in Canada and abroad. Such academic interchange is a healthy index of the University's contribution to psychiatric knowledge.

The library facilities continue to improve and many other evidences of vital activity are apparent. Much of this activity is dependent on extramural support. It is a pleasure to record indebtedness to the Provincial Department of Health, the McLaughlin Foundation, the Atkinson Charitable Foundation, the Medical Alumni Association, the Ontario Association for the Mentally Retarded, and a large number of friends and donors in private life.

Staunch intramural support has been given by the Medical Faculty Council, the Post-graduate Division of the Medical Faculty, and the Academic Council of the Department. In particular my colleagues and I wish to thank the retiring Dean, Dr. J. A. MacFarlane, for his unstinting counsel, guidance, and support over the past fifteen years: his criticism has provided discipline and his encouragement opportunity in the march of progress.

Research

Over the past year research activities have continued in the biological, psychological, and social areas.

Dr. J. W. Lovett Doust, with his team of workers, has pursued the theme of biological rhythms. Exploration at various levels of integration by appropriate well-proven techniques has revealed a pattern of "built-in clocks" which is various for the differing diagnostic groups. The significance of the periodic phenomena, the effects of stressor and remedial factors, and the compensatory interplays offer stimulating prospects in new research territory.

Enquiry into the thyroid functioning in Periodic Catatonia continues. Dr. P. Melville, in collaboration with the Department of Medicine, is studying the day-by-day utilization of tagged thyroxine compounds. Differences between normals and Periodic Catatonics are being investigated for significance.

Dr. J. W. Fotheringham, assisted by a grant from the Group for the Scientific Study of Mental Retardation, has continued to study the effects of stressful motherhood on the foetal adaptation *in utero*. He has succeeded in developing techniques which monitor, although as yet crudely, the response of the foetus to maternal discomfort.

Mr. B. Eglitis has developed a consistent chemical method of estimating adrenalin and non-adrenalin in the human urinary output. This method will be helpful in the kinetic surveys of patients with periodic or recurrent illness.

The drug research unit has continued in its clinical examination of the newer psychopharmacological agents. Each selected medication is given a six month trial in the various clinical settings associated with the Department. Plans are in being to arrange more controlled conditions and more precise measurements of effect in a single setting. The appraisal of a chemical intervention into the multivariant system that makes up a psychiatric illness is one of the most difficult problems in therapeutics research.

Psychological researches continue actively. Dr. S. Neiger and his co-workers have made a final report on their Rorschach studies. They have been concerned to make the Rorschach a more objective research tool. Three indices have been developed—a reality index, a regression scale, and an index of pathological thinking. An immense amount of careful work has brought these inquiries to a very significant conclusion. Dr. B. Quarrington has initiated a study on mood fluctuations, with particular attention to extrinsic variables. Dr. H. Hutchison and his colleagues have investigated the degree and type of mental impairment in relation to the amount of alcohol consumption. Blood alcohol levels will be related to tests of orientation, general information, and abstract reasoning, to provide reliable reference data for use in a court of law. Dr. Hutchison is also attempting to determine the personality attributes which will allow consideration of the diagnosis of psychopathic personality in a legal setting.

Dr. J. W. Mohr, with the staff of the Forensic Clinic, has undertaken a study of sex offenders in court. The purpose of this enquiry is to collect basic data on a broad range of sex offenders appearing before the Toronto courts over a one-year period. A follow-up of sex offenders referred to the Forensic Out-Patient Clinic has been undertaken by Dr. J. R. B. Ball with Dr. Mohr. The analysis of the data shows important differences in the "natural history" of exhibitionism, pedophilia, and homosexuality. Studies of the psychiatric, social, and legal structure of criminal offences (among the criminally insane) have been undertaken in conjunction with the staff of the Ontario Hospital, Penetanguishene. Mr. Daniel Paitish has reported on the parent-child relations of sexual deviates.

Group processes are continuously under study in the various clinic settings: recently an attempt to appraise activity group therapy in children has been undertaken by the staff of the children's division. In this division Dr. E. J. Rosen and his colleagues have studied the problem of unmarried mothers under the age of 16: their report indicates very different socio-psychological factors than might have been supposed.

Dr. D. Cappon and Mr. R. Banks have continued their investigation into the effects of specific overload or deprivation stress on body image, time, and spatial judgements. This work is of theoretical importance in connection with the objective-subjective range of reported experience.

Many other clinical enquiries are proceeding. Dr. J. Armstrong, with the clinic staff of the Alcoholism Research Foundation is studying the influence of Tri-iodothyronine in hastening the metabolism of ethyl alcohol in the acutely intoxicated patient. Dr. P. Melville has continued his research into the effect of ethnic and cultural factors in the phenomenology of psychiatric and psychosomatic break-down. Dr. W. Mitchell is following up a large group of children admitted to the Toronto Psychiatric Hospital. Dr. A. Miller is conducting a ten-year follow-up on 140 patients subjected to lobotomy.

Over and above the direct contribution of these and other enquiries to the development of psychiatry, their effect on an active service and educational programme is immeasurable. Enthusiasm is tempered by salutary criticism: the "good idea" is forced to show itself as a "proven idea."

At the same time an active research programme makes demands on finances and facilities which in aggregate represent a large administrative burden. For their fostering efforts and resource, sincere thanks are offered to administrative colleagues in the University, the Provincial Department of Health, and the Federal Mental Health Grant organization.

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RADIOLOGY

Under the direction of Professor A. C. Singleton

There has been no essential change in the undergraduate or postgraduate teaching in the department during the last year. Conferences between this department and other clinical departments have continued and are of value.

A change has taken place in the staff of the department. Professor K. Hodge has resigned from the directorship of Sunnybrook. His place has been taken by Dr. J. M. Harvie. An image amplifier is being installed in Sunnybrook which will extend the postgraduate teaching at that hospital.

The postgraduate course for the Diploma in Medical Radiology continues to attract postgraduate students and it is a pleasure to report five successful candidates for the Diploma in Medical Radiology.

Our staff in the Toronto General Hospital has been augmented by the addition of Dr. R. M. Parrish in the rank of clinical teacher.

Research

Reported by Professor A. C. Singleton

The previous investigation of patients with primary lung cancer has been continued. The radiological procedure, angiography of the great vessels and cardiac

chambers has been done pre-operatively as a means of assessing resectability and has been carried out by Dr. D. E. Sanders in conjunction with Dr. N. C. Delarue and Dr. G. S. Lanski of the Department of Surgery. This year a few selected cases have been studied with the use of the new 12″ Marconi image intensifier and ciné-angiograms.

Dr. R. B. Holmes is studying the role of angiocardiography in diagnosis of pericardial disease.

Dr. Holmes is conducting research into the application of television in amplification and recording of fluoroscopic images and in X-ray diagnosis using radio-opaque contrast materials.

Dr. Holmes and Dr. A. M. Rappaport of the Department of Physiology are studying methods of performing and recording hepatic venography.

Dr. J. Kempff and Dr. Bruce Bird are currently doing research study on hiatal hernia—a combined project of the departments of Radiology and Medicine. The study will be continued into the year of 1961–62.

Dr. E. H. Shannon reports work in the fields of angiocardiography and aortography has increased greatly and has reached a point where extended facilities must soon be provided.

Dr. J. D. Munn and Dr. E. Kruyff of the Hospital for Sick Children are continuing to investigate congenital dislocation of the hip in children in correlation with the Department.

Dr. C. A. F. Moes is carrying out a study on Spondylarthritis of the spine in children.

Dr. H. E. Meema is completing his work on the estimation of bone density and osteoporosis.

Dr. J. W. Agnos is continuing investigations of the roentgen appearance of the normal duodenal cap, and is collaborating with Dr. Harrison of the Department of Surgery in the investigation of hiatus hernia.

Reported by Professor C. L. Ash

The Ontario Cancer Institute this year has received $48,000 from the Ontario Cancer Treatment and Research Foundation in support of clinical research. The problems under active investigation cover a broad range.

Treatment is constantly under review and special studies are under way to determine whether it may be possible using certain mathematical formulae to predict survival rates of particular groups of patients after one- and two-year intervals rather than waiting to assess the problem at five years.

In co-operation with the Division of Physics the possible clinical usefulness of the electron beam is under study. A total body scanner has been built and is being tested in a variety of clinical conditions. Emphasis in clinical investigation is being directed to a detailed study of the acute radiation syndrome in man. This phenomenon has been studied in detail in animals but little knowledge is available as to why humans develop nausea and vomit within a few hours after receiving radiation. The problem is a practical one in relation to the giving of radiation therapy.

In co-operation with the Division of Biological Research, studies are continuing on the potential value of bone marrow transplantation following lethal total body radiation in such fatal conditions as acute leukemia. Investigation is also continuing on alterations in the immune mechanism of patients with Hodgkin's disease.

New chemotherapeutic agents are under active investigation and special studies have been made during the past year of a plant alkaloid isolated by Dr. R. L. Noble and his group at the University of Western Ontario. On the basis of studies to date it would seem that the agent may have a limited, but useful, part to play in the management of Hodgkin's disease. Along similar lines, and in co-operation with the Division of Biological Research, an attempt is being made to treat patients with choriocarcinoma in a new way. This rare tumour has certain characteristics suggesting that it might be treated successfully by active and passive immunization methods.

In Ontario centres it is generally conceded that pre-operative radiotherapy for certain patients with breast cancer is a useful adjunct in the management of this disease. Special studies are being made to determine in these patients the fate of free cancer cells circulating in the blood.

We are pleased to report that Dr. William Meakin, a graduate of Queen's University, has recently become a member of our staff. He is especially interested in endocrine and other metabolic abnormalities which affect certain patients with cancer and he will be devoting his full time to the study of these practical, yet not well understood problems.

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SURGERY

Under the direction of Professor F. G. Kergin

The Department looks forward to the impending activation of the Curriculum Committee and the opportunity to integrate more fully the teaching of surgery with that in the other clinical and basic science departments.

The University of Toronto Postgraduate Training Course in Surgery continues to attract high-quality applicants from our own and the other medical schools of Canada and a great number of applicants from abroad. There are, at present, 91 postgraduate students in surgery.

As will be seen below the members of the Department have continued to be active in both laboratory and clinical investigation. The need for more and better space for research has become desperate; even now much of this work is being carried out under crowded conditions and no additional projects can be undertaken until space becomes available.

Building programmes, which will improve the surgical facilities, have been completed during the year or are in progress at several of the teaching hospitals. The Toronto Western Hospital has completed a new Emergency and Admitting Department, a new Department of Rehabilitation Medicine, a large auditorium, and is adding a wing which will increase bed accommodation and provide further operating rooms. The Toronto General Hospital has modified existing accommodation into a centralized unit for the Cardiovascular Surgical Service with specially equipped operating rooms, nine beds for intensive post-operative care and fifty patient beds. The Department of Surgery will share in the use of the new Clinical Investigation Unit which is nearing completion.

This year another postgraduate course was initiated. The members of the Department of Surgery of the Toronto General Hospital gave a three-day course for practising surgeons dealing not only with principles of patient management but also surgical techniques. The course was received enthusiastically by the eighty surgeons who attended.

During October Sir Eric Riches, Senior Surgeon to the Middlesex Hospital, was a Visiting Professor in the Department. He visited all the teaching hospitals, participated in "rounds" and teaching and in the work of the Divisions of Urology. The geniality of Sir Eric and the charm of Lady Riches made them many friends while they were with us.

Dean Barnes Woodall of Duke University Medical School was a stimulating and entertaining guest while spending a week as Visiting Chief of the Neurosurgical Service at the Toronto General Hospital during January.

The Balfour Lecture was given on April 24, by Professor Ian Aird, Director of Surgery at the Postgraduate Medical School of London. His subject was "The Association between the A.B.O. Blood Groups and Human Disease," and he pointed out the lack of any clear understanding of why particular blood groups have a statistically valid relationship to susceptibility to certain diseases.

During April and May Dr. E. H. Botterell paid a prolonged visit to Australia and New Zealand as guest lecturer of the Melbourne Post-graduate Medical Committee. He received an honorary membership in the Australian Neurosurgical Society.

At the end of this academic year two senior surgeons retired from the active staff of the Department of Surgery of St. Michael's Hospital to continue in private practice. Dr. W. G. Carscadden and Dr. C. H. Watson have each been head of a general surgical service and for many years have done much to maintain the high standard of patient care and undergraduate and graduate teaching in that hospital. Both will remain in the Department as graduate lecturers.

Dr. R. R. Tasker has been appointed a Markle Scholar. He has, for two years, held a McLaughlin Travelling Fellowship and is returning to a clinical research appointment on a full-time basis on the staff of the Division of Neurosurgery at the Toronto General Hospital to conduct research with a special interest in the pathology and treatment of Parkinson's Disease.

Dr. R. J. Baird was awarded a Roscoe Reid Graham Travelling Fellowship in Surgery and spent three months in Russia and three months in other centres studying cardiovascular surgery, and then returned to join that Division at the Toronto General Hospital. Dr. F. G. Pearson, after a year spent abroad studying thoracic surgery on a McLaughlin Travelling Fellowship, joined the Department of Surgery of the Toronto General Hospital on a general surgical division.

Research

Cardiovascular Surgery

The team studying hibernation under the direction of Dr. W. G. Bigelow has made significant progress during the year in that it has succeeded in obtaining an extract from the tissues of hibernating animals which appears to be related to their ability to withstand low temperatures. The substance has been analysed chemically, its biological activity investigated and methods of synthesis studied. Dr. James Yao has directed the biological aspects of this work and Dr. Edward Schönbaum, of the Department of Pharmacology, has advised on the chemical aspects.

Clinical research, under Dr. Bigelow's direction, has included, with the help of Dr. P. J. F. Kuypers and Dr. R. W. Gunton, critical assessment of the result of direct visual repair of the mitral valve in 20 patients; with the assistance of Dr. W. Sapirstein a similar study of the first 10 patients operated upon for the repair of aortic valve insufficiency and with the help of Dr. H. Basian a follow-up study of 20 patients treated for coronary artery insufficiency by implantation of the internal mammary artery.

Dr. R. O. Heimbecker, with the assistance of Dr. T. Lajos, has studied the fate of heart valve homografts in the experimental animal and has had long-term success with complete replacement of the tricuspid valve. They have also, in the experimental animal, studied the physiological effects of deep local cooling of the heart during extra-corporeal circulation.

Dr. J. A. Key has completed his long-term study of arterial graft prostheses.

Dr. W. T. Mustard, assisted by Dr. W. B. Firor, has attempted to perfect a small pump-oxygenator for new-born patients. The bubble-type oxygenator proved unsatisfactory and attention has now been turned to a disc-type.

Dr. H. F. Robertson is investigating the diffusion of oxygen into the heart muscle resulting from application of hydrogen peroxide to the epicardium and also whether diffusion occurs through rabbit skin when this substance is applied to the surface of a limb.

Dr. G. A. Trusler has pursued an experimental investigation of the effects of reducing the capacity of one or both cardiac atria on cardiac output and function. He has also made a study of the possible protective effect of hypothermia in the syndrome of low cardiac output.

Dr. D. R. Wilson has found that, in the experimental animal, aortic valve homografts, placed in the aorta itself continue to function over a period of years and is undertaking study of methods of placing them within the heart. He has also collaborated in work on renal hypertension and the use of an artificial kidney, to be mentioned below.

General Surgery

Dr. D. J. Currie has, with Mr. A. Smialowski, continued his work on photography as an adjunct to surgical teaching and illustration.

With the assistance of Dr. G. S. Lansky, Dr. N. C. Delarue has continued a follow-up study of a large group of patients who were demonstrated to have cancer cells in the blood-stream at the time of treatment. In collaboration with Dr. W. Anderson and Dr. T. C. Brown, of the Department of Pathology, the evidence of free cancer cells in the blood under various modifications of treatment of malignant disease has been investigated. Dr. Lansky has assisted Dr. P. Conen, of the Research Institute of the Hospital for Sick Children, in culturing samples of malignant tumours from adults to make chromosome counts. Participation in the large-scale study, directed from Roswell Park, Buffalo, of the effect of chemotherapy as an adjuvant to surgical treatment of cancer of the lung has continued as has the collaboration with Dr. D. E. Sanders of the Department of Radiology in an investigation of the value of pulmonary angiography in assessing operability in lung cancer.

Dr. Olive Ibberson continues her long-term follow-up study of patients treated for carcinoma of the breast at the Women's College Hospital.

Dr. A. W. Harrison and Dr. J. C. Lanskail, in association with Dr. P. O'Sullivan of the Department of Medicine, have been studying a large group of patients with oesophageal hiatus hernia who have been treated at St. Michael's and Sunnybrook hospitals.

Dr. N. T. McPhedran, with Dr. S. B. Lee, has continued his experimental study of disease of the pancreas. To investigate the role of vascular spasm noradrenalin was administered intra-arterially, intravenously, and intraductally and it was concluded that arterial spasm plays little, if any, part in the production of experimental acute pancreatitis. From experiments conducted in conjunction with Dr. C. C. Lucas, of the Banting and Best Department of Medical Research, it is concluded that chronic alcoholism does not produce chronic pancreatitis in rats.

Dr. L. J. Mahoney continues his studies of immunization against tetanus.

Dr. R. I. Mitchell has assisted Dr. D. G. Baker, of the Banting and Best Department of Medical Research, in an experimental study of the effects of irradiation on the intestinal tract.

Dr. J. E. Mullens is collaborating with Dr. A. McKay, of the Ontario Veterinary College, in a study of the role of E. Coli endotoxins in the production of enteritis in the experimental animal.

Neurosurgery

Dr. J. R. F. Fleming, of the Toronto Western Hospital, continues his experimental studies of traumatic cerebral oedema in animals and of the results of surgical treatment of Parkinson's disease in human patients.

At the Hospital for Sick Children Dr. E. B. Hendrick is conducting a detailed follow-up study of 3,900 patients who have been treated in the hospital for head injuries with particular reference to the evidence of post-traumatic epilepsy and personality change. He continues his development of intercardiac shunt procedures for hydrocephalus.

Dr. W. M. Lougheed has completed his work on experimental subarachnoid haemorrhage during the year.

Dr. T. P. Morley's work on the incidence and significance of tumour cells in the peripheral blood of patients with glioma nears completion.

Orthopaedic Surgery

Dr. F. P. Dewar has directed Dr. J. J. Wiley, in association with the Workmen's Compensation Board of Ontario, in a study of the use of lumbar discography as a means of investigating low back pain and of the end result of spinal fusion in working men.

Dr. J. G. Evans and Dr. P. F. McGoey at St. Michael's Hospital continue their interest in a long-term follow-up of patients treated for fracture of the femoral neck including those in whom the femoral head has been replaced by a prosthesis.

Dr. W. R. Harris, with the assistance of Dr. R. F. Martin, has continued his work on epiphyseal plates and has studied the effects of fractures of the plate in experimental animals and also has developed a technique for transplantation of the plates with continuation of bone growth.

Dr. I. Macnab, with the assistance of Dr. G. S. Conn, has studied factors influencing bone growth in the experimental animal and has also evolved new types of plastic materials for the purpose of filling bone defects and stabilizing fractures. Successful tests in the laboratory have led to clinical trials which have been promising. A survey is being made of a large number of patients who have sustained whip-lash injuries of the neck in an attempt to elucidate all the factors contributing to disability.

Dr. G. F. Pennal completed the studies of the mechanism of production of fracture-dislocation of the pelvis and the review of the results of wrist fusion mentioned in last year's report.

Dr. R. B. Salter, with the help of Dr. O. R. McNeill, has continued his work on the effects of compression on articular cartilage and has demonstrated that after a period of compression continued use of the joint results in osteoarthritis. He has also shown that if all pressure is taken off articular cartilage degeneration and disappearance of the cartilage occurs. He has studied the production of torsional deformities of long bones in the experimental animal. Long-term clinical studies of the results of treatment of congenital dislocation of the hip and club feet are in progress.

Dr. A. M. Wiley, at the Toronto Western Hospital, has begun an experimental study of hormonal influences on the development of degenerative arthritis.

Plastic Surgery

Dr. S. D. Gordon, with the help of Dr. W. Anderson, of the Department of Pathology, completed his study of the histological changes in buried thrice-frozen dermis in the rabbit and also undertook a study of the fate of the dermis graft aortic replacements in the dog which had been done with the help of Dr. J. A. Key.

Dr. W. K. Lindsay, with the help of Dr. W. T. Sorokolit and the advice of Professor Sylvia Bensley of the Department of Anatomy, has continued his exhaustive study of factors influencing tendon repair and function using the chicken foot as the experimental preparation, and has almost completed his study of the epidemiology of cleft palate and the result of treatment.

Urology

Dr. C. Aberhart, with the assistance of Dr. Marion Ross of the Department of Bacteriology, has made an exhaustive study of the use of Hibitane as a pre-operative skin preparation and as a disinfectant for use in closed drainange following prostatectomy.

Dr. P. O. Crassweller is conducting a study of the level of urinary gonadotropens

in male patients in health and in the presence of acute testicular disease. He is also evaluating blood loss during transurethral resection of the prostate using refrigerated irrigating fluid.

Dr. W. K. Kerr, with Dr. J. D'Aloisio, has made a study of the secretion of B-glucuronidase by the human kidney and bladder in patients with bladder tumours and in controls. This enzyme is believed to activate urinary carcinogens and the study is part of a broader investigation of the etiology of bladder tumours. Studies have also been made on absorption and secretion of the isolated human urinary bladder. Further work has been done to perfect the pump-oxygenator for perfusion of the isolated kidney as a preparation for research into renal physiology.

Dr. G. N. Ranking, at the Toronto Western Hospital, in collaboration with Dr. A. Rapoport and Dr. D. R. Wilson, has undertaken an experimental study of renal hypertension in the dog.

Dr. C. J. Robson is studying a new type of ureterointestinal anastomosis in the experimental animal and also doing an experimental study of Teflon as a possible material to be used in closing vesicovaginal fistulae.

Dr. J. L. T. Russell, with the help of Dr. W. H. McCrae, has done an extensive survey of the results achieved with various methods of creating substitute urinary bladders and by other methods of urinary diversion.

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THERAPEUTICS

The teaching of Therapeutics has been carried on by Dr. W. Garvock, Senior Fellow, who has given the theatre clinics and by various members of the Department of Medicine, who have given the lecture course. So far, a new Head has not been appointed for the Department. The final year teaching has been carried out by Dr. P. Bowen, Dr. R. W. Einhorn, and Dr. R. T. McNeely, who are assistant residents in Medicine at the Toronto General Hospital.

Dr. Garvock has spent a great deal of time and effort in the teaching he has been doing, and his efforts have been much appreciated.

We regret to report the resignation of Miss Lorraine Snyder, who has been secretary to the Department for ten years. She has worked faithfully during this time and has earned the gratitude of the many people who have passed through the Department in this period. We wish her well in her new endeavour.

Research

Dr. W. Garvock, with the assistance of Miss Grace Carleton, has continued the study of plasma volume in a variety of conditions, and attempted to find a correlation with the serum albumin level. He has also carried out studies with chromium-labelled red cells to measure red-cell survival and to detect the presence of splenic sequestration of erythrocytes in haemolytic disease. He has carried out vitamin B_{12} absorption studies using radioactive material in a group of patients with megaloblastic anaemia, malabsorption syndrome, or neurological disorder suggestive of subactive combined degeneration of the spinal cord. Dr. Garvock spent four weeks at the Brookhaven Laboratory in New Jersey studying radioisotope techniques, with the support of the Ontario Cancer Treatment and Research Foundation.

BANTING AND BEST DEPARTMENT OF MEDICAL RESEARCH

Under the direction of Professor C. H. Best

This Department has enjoyed an exceptionally stimulating and productive year. The staff is looking forward to the new laboratories provided by a generous grant from the Wellcome Trust. The funds were given to increase the research facilities of this department.

Dr. B. Rosenfeld and Jessie M. Lang have discovered a biological mechanism in the liver of the rat which caused a rapid fall of the liver lipid fraction which is sensitive to dietary choline. This new observation is at present only a redistribution of lipid in various liver fractions but it is hoped that it may provide a clue to one aspect of the action of choline.

Dr. D. S. M. Haines, working under the general direction of the head of the department, has continued to concentrate on the role of the liver in the metabolism of fat, with special attention to the plasma non-esterified fatty acids and triglycerides. The importance of the liver as a source of plasma triglyceride during diabetic acidosis is being investigated in intact animals and in the isolated perfused liver preparation. The latter technique is also being used in an attempt to characterize the biochemical lesion in the fatty liver due to choline deficiency.

Dr. A. Sirek in collaboration with Dr. A. Renold (Harvard Medical School) is investigating the specificity of the rat epididymal fat pad method for plasma insulin-like activity in totally depancreatized dogs deprived of exogenous insulin. In collaboration with Dr. O. Sirek the effect of total hepatectomy upon serum glycoproteins has been investigated. Preliminary results indicate that the liver plays an important role in their formation.

In Professor D. G. Baker's section the study of radiation injury in the mammal has been continued. The influence of time and intensity factors as determinants of radiation injury has been extended to include observations at the cellular level carried out in collaboration with Dr. G. M. Clark (Department of Zoology). Mr. G. Vivian has investigated the possibility that radio resistance might modify the acute gastro-intestinal injury following partial body radiation of the abdominal region. The study of radiation sensitivity and recovery in various segments of the gastro-intestinal tract has continued in collaboration with Dr. R. Mitchell (Department of Surgery). In collaboration with Dr. A. Carsten (Brookhaven National Laboratories, Long Island), the effects of partial and whole-body X-irradiation on the distribution of plasma proteins has been undertaken. Preliminary results indicate that qualitative as well as quantitative changes in body proteins occur as early responses to radiation injury.

Professor Franks reports that with the assistance of Miss A. McGregor, Miss M. M. Shaw, and Mr. J. Skublics, and after five years of experimentation, a technique which induces within a host a resistance against otherwise lethal numbers of its own cancer cells has been evolved. The autologous tumour-immunity is accomplished by inhibiting the host's inadequate resistance mechanism and substituting that from a second donor animal which designedly has been made mutually tolerant with the host but resistant to the host's tumour. With present techniques the degree of resistance of the resulting graft-hybrid apparently depends, among other things, on the mutual host-donor compatibility and specific tumour-immunity of the graft, as well as on the cohesive state of the tumour within the host-cells with exposed surfaces being vulnerable. With Mr. Charles Lennox, studies on the detection of hypoxia (asphyxia) prior to death have been continued. With Mr. G. A. Meek, co-operative studies on the biological effect of high energy vibrations (noise) are being continued.

In Dr. J. Logothetopoulos' section the cytochemical studies on the islets of Langerhans have been continued and histophotometric methods for the estimation of zinc and cell-granulation have been developed. The mechanism of selective toxicity of organic reagents for beta cells has been further investigated. A study was made of the fatty livers observed in foetuses and in young rabbits. In collaboration with Dr. J. Kraicer the cellular origin of pituitary hormones and the compensatory secretion of corticoids in response to hypoglycaemia have been investigated.

Professor C. C. Lucas and Dr. Jessie H. Ridout have investigated the possible protective effect of dietary alterations upon the lesions caused by feeding glycine nitrile to rats. No significant diminution of toxicity was secured. Professor Lucas, Dr. Ridout, and Dr. R. J. Gillespie are comparing the effects of different kinds and amounts of protein in the diet of rats upon the liver lesions induced by the chronic consumption of intoxicating and non-intoxicating amounts of alcohol. The incidental changes in blood lipids are being followed. They are also comparing the effect of varying the ratio of starch to sucrose in diets designed to produce cirrhosis of the liver.

Professor James Salter and his colleagues have continued their studies of some hormonal and biochemical factors influencing amino acid metabolism in liver and peripheral tissues. The section has also investigated the influence of glucagon on fatty acid, cholesterol, and creatine metabolism, the relationship between the protein anabolic effects of insulin and somatotropin, and the carcinostatic action of alkylating agents and amino acid analogues.

In Professor G. R. Williams' section a study by gas-liquid chromatography of the constituent fatty acids of the liver lipids has confirmed earlier suggestions that choline exerts its influence on the quantity of triglyceride in the liver, while the qualitative constitution of this lipid fraction, with respect to fatty acids, varies with the nature of the lipids in the diet, and is independent of choline intake. Dr. J. Blumenstein has continued his studies of the enzyme glycine methylpherase which has recently been discovered in this laboratory. The enzyme has been partially purified

and the product of the reaction provisionally identified as sarcosine. Studies in the oxidative metabolism of mitochondria have concentrated on the following points: (1) the nature of the inhibition of succinic oxidase which occurs on brief incubation with dinitrophenol; (2) the investigation of oxidative phosphorylation using automatic titration of acid/base changes; (3) the phosphorylations accompanying sarcosine oxidation; (4) the assay of intermediates of the tricarboxylic acid cycle using gas-liquid chromatography.

Drs. Wrenshall and Hetenyi have confirmed the validity of the previously published method of successive tracer injections for calculating rates of transfer of glucose *in vivo* using eviscerated dogs. Applying this method in normal dogs, a delayed increase in the apparent distribution space of glucose caused by insulin has been observed, and its cause is being investigated. The validity of a new method of successive primed increments in tracer infusion rate has also been studied. Both this and the first-mentioned method are suitable for calculating transfer rates of any plasma constituent in animals and man. Dr. Lax has completed calculation of tracer-determined rates of phosphorus transfer through sixteen compartments in the normal and hyperthyroid rat.

The Comptroller, Mr. C. R. Cowan, and his assistant, Mr. K. R. Bowler, have provided invaluable assistance to the staff of this Department and to that of the Department of Physiology in the planning of the addition and in the general administration of services within the Institute.

In the Sub-department of Synthetic Chemistry, Professor E. Baer and his colleagues, ably assisted by Mr. H. Flehmig, have continued their syntheses of natural phosphatides and succeeded in preparing mixed-acid L-α-cephalins (Professor D. Buchnea); L-α-(N,N-dimethyl)-cephalin (Dr. S. K. Pavanaram); L-α-(dioleoyl) lecithin (Dr. A. Kindler) and L-α-phosphatidyl threonine (Dr. F. Eckstein).

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